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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR NOVEMBER 1939

VOL. VII, No. 1 (Not for publication) January 1, 1940

ADMINISTRATION

WHITE, CHAIRMAN OF EASTERN BRANCH, A. A. E. E.

W. H. White, head of the Division of Truck Crop and Garden Insect Investigations, was made chairman of the Eastern Branch of the American Association of Economic Entomologists, at the annual meeting held in New York City on November 16 and 17.

FRUIT INSECT INVESTIGATIONS

Ethylene dichloride emulsion for control of peach borer.--Oliver I. Snapp, Fort Valley, Ga., reports that a peach grower who operates on a large scale used 6,000 gallons of ethylene dichloride emulsion prepared on the farm. He obtained 100 percent kill of the borers, with savings of 25 percent for materials and 80 percent for labor, as compared with the cost of paradichlorobenzene treatment which he used theretofore.

Importance of color of Japanese beetle trap.--A recent report submitted by W. E. Fleming, E. D. Burgess, and W. W. Maines, of the Japanese beetle laboratory, Moorestown, N. J., on the relation of color to the effectiveness of Japanese beetle traps may be summarized as follows: In an investigation conducted during the summer of 1939, traps painted entirely yellow were found to be definitely superior in effectiveness to those painted aluminum, white, light yellow, light blue, dark blue, pink, red, orange, reddish orange, and shades of green ranging from light to dark and from yellowish to bluish. The evidence this season showed that a scouting trap painted with a yellow to which no other pigment was added captured 50.8 percent more beetles than did the green and white standard trap used extensively in recent years. The addition of yellow to other pigments always enhanced their effectiveness. It follows logically that to obtain the greatest capture of the beetles attracted the trap should be painted with a primary yellow. It was demonstrated conclusively that a trap painted green and white is more effective than a green trap in capturing the Japanese beetles attracted to it. It was found, however, that when the baffle and the inside of the funnel of a green trap were painted white, the trap functioned as a white trap; when these parts of a white trap were painted green, the trap performed as a green trap. The shade of green on the outside of the funnel and on the beetle receptacle was a minor factor. As the color of the baffle and the inside of the funnel govern the effectiveness of the trap, there seems to be no necessity for using a dual color scheme on the trap.

Distribution and abundance of Japanese beetle in area of general distribution.--The following summary of the distribution and abundance of the Japanese beetle in the area of general distribution in 1939 has been prepared by T. N. Dobbins, of the Japanese beetle laboratory at Moorestown. The 1938-39 brood of Japanese beetles was characterized by a consistent retarded development in each of the stages. Following an unusually late development of larvae in the fall of 1938, a higher than normal percentage of larvae entered hibernation as second instars. A somewhat wet, cool spring appears to have further retarded development so that general emergence of adult beetles in 1939 was from 10 days to 2 weeks later than normal. At the close of the 1939 beetle season the area of general distribution was estimated to occupy approximately 16,300 square miles, an increase of 1,183 square miles over that of the previous year. This area was distributed among the various States as follows: Connecticut, 286 square miles; New York, 1,141; New Jersey, 7,250; Pennsylvania, 5,013; Maryland, 1,546; Delaware, 1,064. The regional concentration of beetles varied markedly throughout the area of general distribution. As has been the case for the past several years, the infestation was most severe in northern Delaware, northeastern Maryland, and extreme southeastern Pennsylvania. Within this area the infestation, generally speaking, was of about the same severity as that observed in 1938, with heavy foliage injury advancing from 1 to 5 miles beyond points observed the preceding year. Throughout the remainder of the area of general distribution, the infestation was somewhat spotty, as compared with 1938, the infestation in many areas appearing to be heavier than in 1938, while in others it was lighter. On Staten Island and in most of the New York metropolitan area the infestation was not as heavy as the previous year, while north of the city and throughout Connecticut there appeared to be a decided increase. For the first time in several years an increase was observed in the oldest infested area in the vicinity of Moorestown, N. J. A survey of a number of secondary centers of dispersal situated on the Eastern Shores of Maryland and Virginia revealed that a considerable amount of dispersal had taken place. The largest area generally infested involved approximately 415 square miles in Somerset and Worcester Counties, Md., and Accomac County, Va.

Relation of raisin moth to grape spoilage.--Extensive decay of grapes in 1938, accompanied by infestation, led to an investigation of the trouble during the present year. Losses were less severe in 1939, but information was obtained about the relative importance of the raisin moth (Ephestia figulilella Greg.) and other factors. As a part of the work, George H. Kaloostian, of the Fresno, Calif., laboratory, examined damaged bunches of several varieties in 7 vineyards in Tulare and Fresno Counties. The primary causes of injury of 958 damaged bunches were recorded as follows: Crushing caused by pressure of other berries, trellis wire, and leaf petioles, and cracking caused by turgor, 51 percent; insects, 22 percent; and damage by birds, 27 percent. The injuries found (as distinct from primary causes) were:

Rot alone, 49 percent; rot, *Drosophila*, with or without nitidulid beetles, 33 percent; rot and raisin moth larvae, 14 percent; raisin moth larvae alone, 4 percent. Various types of decay, following exposure of pulp by crushing, cracking, and the work of insects and birds, were found in 96 percent of the damaged bunches. Tentative conclusions are that crushing and cracking of the fruit, brought about by cultural practices designed to produce large-size raisins for fresh shipment, caused the greater part of the spoilage in 1939.

MEXICAN FRUITFLY CONTROL

Fruitflies scarce in lower Rio Grande Valley.--Trapping results indicate that the population of *Anastrepha ludens* Loew in the Rio Grande Valley was very low during November. From 35,370 trap operations, only 1 specimen was recovered and this fly was taken in the early days of the month. Intensive inspection of groves failed to reveal any fruit infested with larvae of *A. ludens*. Movement of fruit from the regulated area has exceeded all previous records for the same period.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Parasitization of European corn borer in Massachusetts and Connecticut.--C. A. Clark, Moorestown, N. J., reports as follows on field-status studies of parasites on the first generation of the European corn borer in parts of Bristol and Plymouth Counties, Mass., and in a part of Hartford County, Conn.: "The area covered in this survey totals approximately 530 square miles. Four exotic parasites, *Inareolata punctoria* Roman, *Lydella grisescens* R. D., *Macrocentrus gifuensis* Ashm., and *Chelonus annulipes* Wesm., were reared from the total of 4,738 specimens of the corn borer. The first 2 species were reared from the collections made in central Connecticut and all 4 were obtained from specimens taken in southeastern Massachusetts. The average parasitization by all species in the Massachusetts locality totaled 26.1 percent and in the Connecticut locality 37.6 percent. In southeastern Massachusetts the highest parasitization by *M. gifuensis* in any collection was 46.4 percent and the average 12.1 percent; by *I. punctoria* the highest was 30.1 percent and the average 6.3 percent; for *L. grisescens* in the same locality the highest recorded parasitization of the borer was 44.3 percent and the average 6.0 percent; while for *C. annulipes* the highest was 12.2 percent and the average 1.4 percent. In central Connecticut the highest parasitization on the summer generation of the borer in 1939 by *I. punctoria* was 73.1 percent and the average 36.0 percent. For *L. grisescens* in this locality the highest parasitization of the borer encountered in this survey was 5.6 percent with an average of 1.2 percent. Very small numbers of the native parasites *Bassus agilis* Cresson and *Labrorychus prismaticus* Nort. were recovered."

Resistance of sweet corn to the European corn borer.--Morris Schlosberg, Toledo, Ohio, has summarized the data relating to studies of sweet corn resistance to the European corn borer, which have been in progress near Toledo, Ohio, from 1935 to 1939, with inbred strains supplied by the Bureau of Plant Industry and various State agricultural experiment stations. During the 5-year period a total of 690 entries, comprising 451 Bantam, 134

Country Gentleman, and 105 Evergreen lines, were tested in 3-fold replication, using the method of random blocks. In each year the entries were uniformly hand-infested with egg masses and the surviving larval progenies determined by dissecting the plants. The expected larval populations for the conditions of test among the strains were determined by multiple regression methods, taking into account the effects of seasonal growth requirements and rates of natural infestation. The strains were then appraised on the basis of the differences shown between their observed and predicted larval populations, expressed as percentages of the predicted values. Decreases from the predicted levels of larval populations were considered to indicate possible resistance, and increases were regarded as indicating possible susceptibility to survival of the larvae, when their magnitudes exceeded at least once the standard error of estimate associated with random variability. The possibly resistant selections were retested in succeeding years, as the results of any single season were considered inconclusive. Among the strains tested for 3 years or more, the following show possibilities of possessing inherent resistance to the survival of the larvae, as their observed levels of larval populations were found to be consistently lower than those expected for their conditions of test: The Bantam strains Michigan 1828, Iowa 9, Minnesota 26-34, Iowa 45, Minnesota 13-34, Purdue 14, and Michigan 1823; the Country Gentleman strains Iowa 1434, Purdue FR22(4) 1, Purdue 8035(6)1, Iowa 1445, Purdue S36(5)1, Purdue S10(5)1, Purdue 7620(8)1, and Purdue 6691(9)1; and the Evergreen strains Maryland H126, H33, Iowa 1071, Purdue 119, Purdue 1101, Purdue 1014, Iowa 1248, and Illinois 13. The most favorable indications of resistance were shown by the Bantam selections and the least promising by the Evergreen selections. None of the strains tested was found to be immune to borer establishment, but the evidence of supplementary tests permits the conclusion that the Bantam strain Michigan 1828 is inherently relatively resistant to the survival of larvae of the European corn borer.

Fall brood of grasshopper in Yuma County, Ariz.--O. L. Barnes, Tempe, Ariz., reports that while making a grasshopper-egg survey on November 10 in a large alfalfa field at Blalack, in the south Gila Valley a few miles east of Yuma, it was observed that nymphs of *Melanoplus differentialis* Thos. in the intermediate and late instars made up the bulk of the living grasshopper population. No living adults of that species were seen or swept, but a few dead adults of the spring brood were observed scattered about over the ground. The field was again visited on November 22 and the *M. differentialis* population was estimated at 6 hoppers per square yard over a 40-acre portion of the above field, ranging from 3 to 15 per square yard in different places. A very few, less than 1 percent of the population, were recently molted adults. The nymphs were in instars 2 to 5, chiefly 3 to 5. Both adults and nymphs of the fall-appearing brood were from slightly to considerably smaller than those of the spring-appearing brood in the same vicinity. It seems probable that this represents a second generation.

JAPANESE BEETLE CONTROL

Finding of egg clusters revokes nursery permit.--Inspection of nursery stock at one of the nurseries in the Middletown, Conn., area resulted in the finding of two gypsy moth egg clusters. Prior to this fall, this establishment with those in the immediate neighborhood had been under permit, which allowed them to ship all of their stock under certification. When egg clusters were found on an adjacent nursery, all nursery permits in that section were suspended.

Christmas tree infestation.--One gypsy moth egg cluster was found on a Christmas tree in a carlot shipment of trees inspected at Harmony, Maine, for shipment to York, Pa. The infested tree was removed from the shipment.

Cordwood brushed to remove infestation.--A cord of grey birch wood inspected at Dixfield, Maine, was so heavily infested with gypsy moth egg clusters that it was impracticable to endeavor to creosote and remove each individual egg cluster. A stiff-bristled brush was obtained and the entire surface of each 4-foot log was brushed. Approximately 350 egg masses were removed in this manner. At Danvers, Mass., 24 egg masses were taken from 8 cords of wood similar to the above logs. These logs were later manufactured into novelties and shipped to noninfested territory.

Record lumber shipments.--Shipments of lumber from the Rochester, N. H., district exceeded the previous all-time high established in October 1939. Inspections and certifications in November included approximately 1,361,800 board feet. Among infestations removed from this material were 19 egg clusters from material inspected at Conway, 4 from material inspected at Campton, and 3 from material inspected at Rochester. A 50-percent increase in shipments of pulpwood and lumber was reported from the White River Junction, Vt., district.

Evergreen boughs yield egg clusters.--In the course of the bulk inspection of 12 tons of evergreen boughs at Rowley, Mass., 197 egg clusters were removed. This evergreen material was intended for manufacture into Christmas wreaths for shipment from the infested zone. At Barnstead, N. H., 10 egg clusters were removed from 7½ tons of fir balsam boughs. Another egg mass was removed during the inspection of a ton of evergreen boughs inspected at Putney, Vt.

Greater demand for laurel inspection.--An increase in applications for the inspection of woodland areas from which various collectors obtain their laurel supply was reported from a number of New England districts. One of the lots at Southampton, Mass., disclosed infestation and the collector was informed that laurel from this plot would not be eligible for certification. Field inspection of the laurel lots permits certification of all material gathered from uninfested premises.

Egg mass on pine cone.--At Providence, R. I., 1 egg mass was found in a bulk shipment of 1,500 pine cones that were to be used in decorating baskets for shipment to points outside the gypsy moth infested area.

Leak detectors to be furnished each field office.--Halide leak detectors are being provided to each district and suboffice for use in checking possible leaks in methyl bromide fumigation chambers. Check-ups are made constantly by the treating section of the Division, testing for possible leaks in chambers now in use. The number of plants fumigated with methyl bromide during November was slightly under the October total, 80,018 plants having been fumigated in November, bringing the grand total for the year to 539,242 plants.

Cooperative soil-treating program continued.--Soil temperatures held up sufficiently during November to permit lead arsenate applications to 209.5 acres for the control of isolated Japanese beetle infestations in 2 cities each in Indiana and Michigan, 1 in New York, and 10 in North Carolina. Indiana treatments included 49.7 acres covered in Indianapolis and 13.2 acres treated in Logansport. Twelve acres were treated in Detroit, and 0.8 acre in Dearborn, Mich. In Dansville, N. Y., 19.3 acres in the residential section were treated from November 2 to 14, inclusive. Soil treatments during November in North Carolina were as follows: Charlotte 12.9 acres, Durham 8.7, East Spencer 25.2, Goldsboro 5.1, Greensboro 4.7, High Point 13.1, Raleigh 4.8, Spencer 12 acres, Wilson 0.9 acre, and Winston-Salem 27.1 acres. These treatments were all cooperative projects.

Partially deafened by Japanese beetle.--A newspaper article appearing in a recent issue of the Baltimore Sunday Sun stated that Dr. Max Kimbrig of Huntington, N. Y., had reported to the American Medical Association that a Japanese beetle had devoured most of the ear drum of a patient that came under the doctor's observation.

Fumigatorium for rent.--One of the southern New Jersey nurserymen who has equipped himself with a methyl bromide fumigation chamber has been renting the chamber for use by other growers who are not so equipped. This has proved a very satisfactory arrangement for growers in that vicinity, and has provided an outlet for stock that otherwise would not have been eligible for certification.

Baltimore trapping results.--According to a report published in the Baltimore Evening Sun of October 25, 20 barrels, or approximately 12,000,000, Japanese beetles were captured in that city during the last season. The report stated that quite a number of traps had been stolen or broken. Included in the article were instructions for the lead arsenate treatment of lawns to prevent grub injury.

Hibernating larva in peony-root cavity.--In the course of individual inspection of 10,000 peony roots for a grower at Berlin, Md., an inspector found a Japanese beetle grub hibernating in one of the crown cavities. The entrance to the cavity was covered with a small amount of soil. Inspection of these roots required considerable time due to the many cavities in each washed root.

Crews cooperate in control of stock diseases.--As a sanitary measure, all crews working on livestock farms or on poultry ranches sterilize their shoes or boots. Several owners who have protested against eradication and sanitation crews working on their properties have been very cooperative since they learned that the men take precautions to protect livestock against infectious diseases. Instructions to crew members direct that they are not to approach within 100 feet of barns, barnyards, or other places where livestock is kept. Before entering pastures or other portions of the property the men use sponges or cloths to wash their footwear with a solution made of 4 ounces of liquid saponified cresol solution to a gallon of water.

One first-record infection.--A first-record report was received during the first week in November confirming the presence of Dutch elm disease infection in an elm located in the town of Oxford, New Haven County, Conn. The sample from which the fungus was cultured was a recollection from a two-leader tree of 1 inch and 1½ inches diameters in a supposedly *Cephalosporium*-infected section within the working radius from another infection in this locality. Intensive scouting and sampling within a 500-foot radius of previously determined infections in the town of Woodbury, Litchfield County, Conn., turned up another infected elm. The confirmed tree was almost completely dominated by two larger elms growing on either side 4 feet and 10 feet distant. Discoloration characteristic of the Dutch elm disease fungus was found only in one of the lower side branches of the smaller tree.

Crew destroys elms removed in road widening.--One crew was assigned for part of November to destroy elm trees removed by a contractor engaged in widening State Route No. 100 through Elmsford, Westchester County, N. Y. Approximately 50 elms ranging from 10 to 35 inches in diameter were removed. On rainy days the wood was burned on the site. The remainder of the wood was hauled to a burning site 1 mile distant. These trees were in a section where confirmed trees had been found in the past, so that elm woodpiles in that vicinity would have contributed to a build-up in the elm bark beetle population and a possible recurrence of the disease.

FOREST INSECT INVESTIGATIONS

Peeling method of mountain pine beetle control in sugar pine tested.--G. R. Struble, Berkeley, Calif., reports that in three tests conducted near the Miami field base, located on the Sierra National Forest, Calif., to determine the efficiency of this method of summer control where shade prevents sun-curing, the results were all identical and showed that the method was highly effective against all stages of larvae, pupae, and early callow adults.

Heavy populations of western pine beetle in 1939.--Mr. Struble also reports that adults of *Dendroctonus brevicomis* Lec., numbering 6,685, emerged from 50 square feet of ponderosa pine taken from a large tree located near the Grizzly Giant in Mariposa Big Tree Grove, Yosemite National Park, Calif. The infested bark was placed in a rearing cage at the Miami field base, on July 22. Emergence of adults started on August 2 and was completed August 16, with an average of 134 beetles per square foot. High populations such as this are indicative of aggressive activity.

Extensive range of fall webworm in California.--J. E. Patterson, Berkeley, reports that during the summer and early fall periods of the 1939 season, the fall webworm developed to epidemic proportions over an extensive range in northern California. The range of its occurrence extended from the middle fork of the Yuba River north through the Sierra and Cascade ranges to the Siskiyou Mountains on the California-Oregon State line, and south from this point through the Coast Range to Mt. St. Helena. In general its occurrence was confined to the range of its principal host, madrona (Arbutus menziesii Pursh.).

Oystershell scale active on Sierra National Forest.--According to Mr. Struble, unusually heavy damage by this scale was noted in the vicinity of Fish Camp, Calif., in August 1939. The damage was confined to willow, deerbrush, and snowbrush, where extensive killing resulted on brush-covered hillsides northwest and east of Fish Camp.

Mountain pine beetle suffers high mortality.--W. D. Bedard, Coeur d'Alene, Idaho, reports that during the development of the mountain pine beetle from egg through the young adult stage it suffers an average normal mortality of slightly more than 90 percent. This mortality, which is the average to be expected in all broods of this insect, was determined from an intensive examination of 254 infested white pine trees studied during 4 seasons from 1936 to 1939, inclusive. In addition to the mortality during development, the new adult beetles suffer an additional flight mortality from the time they emerge until they have made attacks and are ready to lay eggs, thus resulting in a possible total mortality of something over 95 percent for the complete generation. Although both physical and biological factors may account at times for nearly all this mortality, much of it at other times results from the attack of parasitic and predaceous insects and mites. Mites are particularly active in destroying eggs and tiny larvae. A braconid parasite, Coeloides dendroctoni Cush., and 2 chalcids, Cecidostiba dendroctoni Ashm. and Pachyceras eccoptogastri Ratz., attack the larvae. The larvae of 2 predaceous flies, Medetera aldrichii Wh. and Lonchaea viridana Meig., as well as the larvae of 3 clerid beetles are active in destroying larvae, pupae, and new adults of the mountain pine beetle.

Beetles and blow-down.--According to Dwight A. Hester, Fort Collins, Colo., the Black Hills beetle control project on the Powell National Forest in Utah is being complicated by a blow-down. Last June a severe wind uprooted many trees on the East Fork drainage of the Forest. The roots of most of these trees were in sufficient contact with the soil to keep the foliage in a half-living condition during the summer. When the beetle flight occurred large numbers of the down trees were infested, especially on the under side. The broods in these trees are very heavy and further developed than they are in the standing trees. Nearly all were in the pupal stage when the area was examined late in November. Where the blow-down is heavy enough to form a windfall several trees deep, treating has been very difficult. In many places a number of Douglas fir and noninfested trees must be bucked into lengths and removed before the infested trees can be treated.

Status of European spruce sawfly in United States.--According to P. B. Dowden, New Haven, Conn., the entire spruce area of New England and New York is, in general, lightly infested with the European spruce sawfly, although there are several local areas of very heavy feeding. During 1939 there has been little change in the intensity of the infestation over the general area, but some of the heavy local infestations have increased considerably. H. B. Pierson reports an increase in the intensity of the infestations in the northern and eastern parts of Maine. In the southern part of New Hampshire the severely affected area increased in a wide circle around

Dublin, where it was first observed. About 100 square miles became heavily infested, but feeding was greatly reduced in stands which previously were heavily attacked. The same conditions took place in southern Vermont near Wilmington. The heavily infested area now includes between 50 and 100 square miles, but trees heavily attacked in 1937 and 1938 were not seriously fed upon in 1939. In central Vermont near Lincoln the whole infestation has decreased noticeably. In New York conditions are about the same as in 1938 with the sawfly generally present but nowhere in epidemic proportions. Observations made in 1939 seemed to indicate several reasons for the increase of the sawfly on the periphery of the heavy infestations and a reduction at their centers in the southern part of New Hampshire and Vermont. There was such a tremendous larval population in the center of the heavy infestations in these areas that suitable larval food was exhausted comparatively early in the season and severe mortality occurred. The progeny from larvae which did complete development found even less favorable food and mortality was often almost complete. Accompanying this lack of suitable food was the prevalence of disease which took not only an enormous toll where larvae were abundant, but also killed a high percentage of larvae in the older infestations where the larval population was low. On the periphery of the heavy infestation, although disease was prevalent, the abundance of food apparently insured the development of large numbers of larvae to the hibernating stage. Very few trees have been killed by the sawfly in southern New Hampshire, but the 1939 feeding included large numbers of "scattered spruce," i.e., trees growing among hardwoods. In general, these trees were more seriously defoliated than trees growing in spruce stands, and probably many will die. In southern Vermont there has been more mortality among trees heavily fed upon in 1937 and 1938, particularly on the edges of infested stands. The percentage of killed trees has nevertheless been very low. Most of the severely affected trees in this area grow in small but solid spruce stands. Enough foliage has apparently been left in the crowns to insure the survival of most of the trees if they are not severely attacked again in the immediate future.

Concentrated spray effective against white pine weevil and Pales weevil.--S. F. Potts, New Haven, reports that concentrated spray applications effected nearly 100-percent control of these weevils at a cost of about $2.50 per acre for the white pine weevil and $1.50 per acre for the Pales weevil. Lead arsenate and cryolite were the most effective insecticides tested. About 5 pounds of insecticide per acre is required for the white pine weevil and 1 pound for the Pales weevil. Conventional spray methods are ineffective and too expensive. The equipment used for the application of the concentrates was very inexpensive and a minimum of labor was required.

A parasite recovery of interest.--J. V. Schaffner, Jr., of New Haven, reports that on November 3, 1938, T. J. Parr made a collection of cocoons of the larch sawfly (*Lygaeonematus erichsonii* (Htg.)) in larch plantations at Mount Union, Pa., where severe defoliation occurred the previous summer. In June and July 1939 six parasites emerged from these cocoons in the laboratory. Five of the specimens have been identified at the National Museum as Mesoleius tenthredinidis Morley[1], a European species. This parasite was first introduced into Canada in 1912. As far as is known only two small colonies of this species have been liberated in the eastern part of the United States. These were received from the Canadian Parasite Laboratory in 1929 and 1931, and were liberated in New Hampshire and Massachusetts. This species has been extensively liberated in Canada and has been reared at New Haven from cocoons collected in Montana, Minnesota, Wisconsin, and Michigan. The parasite may have spread from the bordering provinces of Canada or it may have been in this country as long as the host. The discovery of the parasite in Pennsylvania, hundreds of miles from the nearest point of liberation, supports the latter idea.

Low gypsy moth populations in ecological plots.--Henry A. Bess, New Haven, reports that studies on the annual population density of the gypsy moth in 3 experimental areas where no artificial control measures are applied show that the population of the insect has either decreased to a low density or remained in a somewhat static condition at a low population level for the last 3 or 4 years. These 3 study areas represent a total of from 1,300 to 1,400 acres of infested woodland in Massachusetts and Connecticut. Cruise lines are run through these areas in the fall of each year and a measure of the population density secured by counting the egg clusters present in sample plots, 100 square feet in area, taken at regular intervals on the cruise lines. In the study area on the Natchaug State Forest, Eastford, Conn., the insect has been exceedingly scarce for the last 4 years. The infestation in the 1,000-acre study area has been so low during this period that no egg clusters have been found in the hundreds of sample plots examined. However, in traversing the cruise lines a special effort was made to find egg clusters and so far, a total of from 2 to 17 egg clusters have been found each year. The numbers of egg clusters found by this method were as follows: 4 in 1936, 17 in 1937, 2 in 1938, and 3 in 1939. The insect was abundant in about one-third of the 300-acre study area on the Freetown State Forest, Freetown, Mass., in the fall of 1937, hundreds of egg clusters being present per acre. However, comparatively little defoliation occurred in this area in the spring and summer of 1938. The population was reduced to a point where egg clusters were difficult to find in the fall of 1938, with only a half dozen occurring in over 100 sample plots. This fall the population is still lower. A 250-acre study area was set aside on the Harvard Forest, Petersham, Mass., during the winter of 1936-37 and population studies were made in the area until the fall of 1938, when it was abandoned because of hurricane damage to the woodland. In the fall of 1936 this area contained a fairly heavy population of the insect in a number of "pockets" where a dozen or more egg clusters might be found on individual trees. In the spring and summer of 1937 a number of trees were defoliated in these heavily populated "pockets." That fall the population was lower than the year before but egg clusters were common throughout the area and there was 1 heavy "pocket" of about ½ acre in size where egg clusters were abundant. There was no noticeable defoliation in the area in the spring and summer of 1938 and egg clusters were scarce that fall. After the hurricane in September 1938 the above study area was abandoned and similar studies started in an adjacent infested woodland of about 60 acres. This area was well populated with egg clusters in the fall of 1938, there being approximately 500 per acre. There was no noticeable defoliation in the area in the spring and summer of 1939 and only 3 egg clusters were found in about 400 sample plots this fall.

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[1] Some forest entomologists are of the opinion that the larch sawfly is circumpolar and has been with us always. The widespread occurrence of Mesoleius might be considered further proof of this. Other evidence is the defoliation effects recorded in tree rings as long as 100 years ago in the Lake States, which may have been caused by this sawfly.

Notes on development of smaller European elm bark beetle.--T. H. Jones, Morristown, N. J., reports that elm trees which were cut in New Jersey on August 8, August 22, and September 6, 1938, were left in the field until October 4, when the stems were sawed into sections and brought to the Morristown, N. J., laboratory. On December 14 the sections were divided into comparative lots and placed in four locations--the basement of the laboratory building, on the ground in the laboratory yard, on a rack in the laboratory yard, and in a room in an unheated laboratory garage. On April 27, 1939, the logs were placed in metal drums in the four locations. The drums had holes in their sides to which glass bottles were attached into which beetles could emerge and from which they could be removed and counted daily. Large numbers of the smaller European elm bark beetle (Scolytus multistriatus Marsh.) issued during the spring and summer. Attack by this species undoubtedly began immediately after the trees were cut. When it was believed that emergence was completed the logs were debarked and all egg galleries of the species counted and measured. The main conclusions to be drawn from the experiment are as follows: (1) Logs from trees cut September 6 gave much poorer emergence per unit length of egg gallery than logs from trees cut on August 8 or August 22; (2) logs stored in the garage gave better issuance per unit length of egg gallery than did those stored in the other locations in the August 8 and August 22 cuttings; (3) beetle emergence began on May 13, May 31, and June 2 in the basement, yard, and garage, respectively; (4) except in the basement, the bulk of emergence occurred slightly earlier from the August 8 cutting than from the August 22 cutting; (5) under all conditions of storage, emergence from the September 6 cutting began later than it did from the earlier cuttings.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Gypsy moth crews work in open country during hunting seasons.--As is customary at this time of year, the supervisors of the various districts where gypsy moth work is performed planned their work so that the crews would perform their duties in open country or in residential sections during the hunting seasons. Although the open seasons on deer are of brief duration, they occur at different times in the various States, extending from the middle of November, when the season opened in Vermont, to the first part of December. The removal of the workers from the forest eliminates, as far as possible, the danger of injury to crew members by stray bullets when the hunters are in the woods. This annual precaution is made necessary by the carelessness exhibited by many of the deer hunters, some of whom use high-powered rifles. The men in Vermont made slow progress at first under the changed conditions, as practically all of them had been engaged on woodland work only, but they soon became adapted to work in open country. An open season of 4 days was declared on bear in Pennsylvania, beginning November 15, but no appreciable modification of work was necessary, as few crews engaged in gypsy moth work were operating in areas frequented by these animals. Workers were not withdrawn from the woodlands during the open seasons on small game, but supervisors and foremen were constantly on the alert for hunters, who were warned that men were working in the vicinity.

No gypsy moth infestation found at two assembling cage sites in Vermont.--Close scouting work was completed in a circular area 1/2 mile in radius around an assembling cage site in the township of Johnson, Lamoile County, Vt., where a male gypsy moth was recovered last summer, but no indication of existing infestation was found. Similar work was also completed in an area of equal size around an assembling-cage location about 35 miles southwest of Johnson, in Hinesburgh, Chittenden County, where one male gypsy moth was captured during the period of flight, also with negative results. Both towns are situated in the northern portion of Vermont.

Small gypsy moth infestation found in Massachusetts near New York State line.--As a result of several weeks' scouting work conducted in a belt of heavily wooded forest land in the western part of Williamstown, Berkshire County, Mass., which borders Berlin Township, Rensselaer County, N. Y., a small gypsy moth infestation was found at a relatively high elevation close to the New York State line. Although it was not anticipated that scouting would be necessary in this area during the current fiscal year, the discovery of scattered small infestations by New York State forces in the eastern part of Berlin Township last month made advisable a modification in the plan of work to permit the examination of a strip of woodland in Massachusetts adjoining that scouted by the New York State force.

Quality of gypsy moth scouting work improves as the men gain experience.--Regular experienced employees detailed to checking and reinspection work in towns previously scouted by W. P. A. crews in Massachusetts reported that a decided improvement was observed in the quality of the work done this season, as compared to that of previous years since W. P. A. gypsy moth work was begun. Many of the men now carried on the pay roll have scouted a year or more, and the experience gained during that time is being reflected in their work.

Work resumed in section of gypsy moth colony infested with poison ivy.--Employees engaged in gypsy moth extermination work at an infestation in Southbury, New Haven County, Conn., resumed the cutting and assembling of brush and other waste wood, about the middle of November, in a section where work was temporarily discontinued several weeks ago on account of the large quantities of poison ivy and poison sumac which were in full foliage at that time, and which could not be readily handled without danger of poisoning the workers. There appears to be much less liability of poisoning from these plants during the winter months, but even then the workers were constantly warned against the careless handling of the brush and vines.

Several gypsy moth colonies near assembling cage sites offer no obstacles to eradication measures.--A number of gypsy moth infestations were discovered in Pennsylvania as a result of close scouting work conducted in the vicinity of locations where male moths were recovered at assembling cages during the past summer. Many of these colonies appeared to be confined to relatively small areas, and they should not be difficult to exterminate.

New agencies in Pennsylvania make creditable showing on gypsy moth work.--Reports from the gypsy moth supervisory personnel directing the work of National Youth Administration workers in Pennsylvania indicate that these young men, most of whom are under 25 years of age, are taking an increased interest in the work and, considering their limited experience, are making a creditable showing. They have already accomplished considerable valuable work by creosoting large numbers of gypsy moth egg clusters in the infested areas. The prospect of developing some efficient gypsy moth workers from this group appears promising, as many of the young men had previous training in C. C. C. camps and had become accustomed to outdoor work. Some progress was also made during November by the force of the State Department of Public Assistance, although the number of men actually employed on gypsy moth work was small.

C. C. C. gypsy moth work restricted to two areas during deer-hunting season.--The week ended November 25 was open for deer hunting in Vermont, and C. C. C. gypsy moth workers confined their activities to thinning work at two colonies. The areas where the men were working were well posted in order to warn hunters that C. C. C. enrollees were working in those vicinities.

Report of C. C. C. burlapping work.--The volume of burlapping work done last season was considerably less than that of the previous year because of the marked reduction in the number of men available for the work. Approximately 200,000 trees were burlapped in 15 towns and slightly more than 980,000 gypsy moth caterpillars and pupae were destroyed. Later inspections of the burlapped areas showed that conditions in these sections were greatly improved.

PLANT DISEASE CONTROL

Barberry eradication.--Stanley Castell, leader in charge of barberry eradication in Indiana, reports that during the period August 1 to October 31, a thorough survey was made of 1,2[illegible]0 square miles in 14 counties, with the result that 68,265 barberry bushes were destroyed on 31 new properties and 36 where bushes had previously been found. The following table summarizes this work by counties.

County	Area surveyed	New properties		Old properties		Total bushes destroyed
		Cleared	Bushes killed	Inspected	Bushes killed	
	Square miles	Number	Number	Number	Number	Number
Adams	84	3	53	14	0	53
Benton	57	1	2	0	0	2
Fountain	127	2	4	27	0	4
Hendricks	124	4	10	5	6	16
Henry	0	2	21	0	0	21
Jasper	408	7	25	14	0	25
Knox	13	0	0	0	0	0
Lake	0	2	3	2	7	10
Morgan	0	0	0	1	5	5
Parke	29	0	0	0	0	0
Pulaski	220	3	682	8	18	700
Tippecanoe	0	1	1	0	0	1
Warren	148	0	0	11	0	0
White	80	6	67,428	14	0	67,428
Total	1,290	31	68,229	96	36	68,265

Barberry bushes destroyed in Michigan, 1939.--F. B. Powers, leader in charge of barberry eradication in Michigan, summarizes progress in eradication during the period May to October 1939, as follows:

County	Area surveyed	New properties		Old properties		All properties	
		Cleared	Bushes destroyed	Cleared	Bushes destroyed	Cleared	Bushes destroyed
	Sq. mi.	Number	Number	Number	Number	Number	Number
Bay	38	0	0	0	0	0	0
Benzie	24	12	453	11	171	23	624
Clare	2	0	0	0	0	0	0
Clinton	0	2	1,655	0	0	2	1,655
Eaton	0	1	15	0	0	1	15
Grand Traverse	36	51	1,508	19	84	70	1,592
Hillsdale	152	13	31	5	152	18	183
Ingham	0	2	3	0	0	2	3
Isabella	69	8	43	0	0	8	43
Jackson	0	2	8	2	8,012	4	8,020
Kent	87	24	659	7	84	31	743
Leelanau	22	15	225	17	1,185	32	1,410
Mecosta	111	7	69	0	0	7	69
Saginaw	103	46	2,306	4	25	50	2,331
Tuscola	196	11	706	4	463	15	1,169
Total	840	194	7,681	69	10,176	263	17,857

Bushes were found on 194 new properties and on 69 where bushes had previously been found. Of the total number of bushes destroyed, only 476 had reached the fruiting stage.

Accomplishments in blister rust control.--Ribes-eradication work for the protection of valuable white pine stands has been discontinued for this year in most of the forest areas where this work has been in progress. During the active season, extending from May to November, very satisfactory progress was made on this project. The following table gives a preliminary report of the results accomplished by regions.

Region	Area worked[1]	Ribes pulled	Labor	Ribes destroyed per acre
	Acres	Number	Man-days	Number
Northeastern	680,403	13,472,709	177,411	20
North Central	371,789	17,095,656	85,931	46
Southern Appalachian	394,485	2,961,962	32,121	8
Western white pine (northeastern Wash., northern Idaho, northwest Montana)	105,064	28,255,561	156,123	269
Sugar pine (California and Oregon)	147,623	18,607,933	166,028	126
Total	1,699,364	80,393,821	617,614	--
Average	--	--	--	47

[1] These data include the areas initially cleared of Ribes, as well as those reworked.

Ribes owners in Delaware cooperate to protect white pine.--In 1 section of Newcastle County, Del., where blister rust control work was under way, 89 persons were found to have cultivated currants and gooseberries, and all but 19 voluntarily gave up their bushes and allowed the blister rust agent and his assistant to remove them. In 4 instances the cooperating owners took out their own bushes. Several of the 19 owners who retained their Ribes are commercial growers and have from 100 to 500 bushes. The pines being protected are largely ornamental, though there are several forest plantations in Newcastle County, the largest being on the Wilmington Watershed at Hoopes Reservoir. Wilmington has followed the lead of Baltimore in planting white pine in large quantities around their reservoirs. So far only one location of wild Ribes has been found in the State.

Blister rust notes from New England.--A. C. White, blister rust agent in Rhode Island, writes that a check-up in towns where the most damage was done to white pine timber by the hurricane of last fall, showed that seedlings of this species were coming in thickly on some of the affected areas. His observations indicate that the seeds are there and the more disturbance of the soil there is, the more seedlings make their appearance. There is also considerable young growth, ranging from 5 to 20 years old, growing on areas where trees were blown down. There have been 792,500 white pine planted in Rhode Island since the hurricane and an increase over this figure is expected next year. Through educational work, several property owners have become interested in white pine planting. One of the greatest losers from the hurricane, a property owner with an estate in the town of Coventry, who lost about 10,000,000 board feet of lumber, is planning to plant about 1,500 acres to white pine next spring. C. C. Perry, in charge of blister rust control work in Massachusetts, visited the salt-spray-damaged areas in the vicinity of Marion and Mattapoisett in November and found that the pines show a remarkable recovery from the damage they suffered last fall when they were "burned" by salt spray following the hurricane. All dead needles have fallen, therefore the browning aspect has completely disappeared. The crowns, however, appear sparse, owing to the fact that only the 1939 needles have persisted and these needles are, in general, rather stunted. There is some evidence of failure of adventitious buds, where trees are shaded. Buds for 1940 appear to be weak.

COTTON INSECT INVESTIGATIONS

Pink bollworm infestation in okra.--Because of the importance of okra as an alternate host plant of the pink bollworm in the lower Rio Grande Valley, studies were undertaken this season at Presidio, Tex., by S. L. Calhoun and O. T. Robertson to determine whether any varieties were immune or resistant to attack. Several thousand acres of okra are grown in the valley for shipment to outside areas during the winter months, and the finding of infestations in commercial shipments has made it necessary to place restrictions on the movement to noninfested areas. The presence of suitable pods for breeding during the season when no cotton is present also defeats the purpose of the cotton clean-up campaign to produce a host-free period. Seeds of 33 varieties or strains of foreign and domestic okra were obtained from Director Cooper, of the South Carolina Experiment Station, and from commercial seedsmen for planting at Presidio in the presence of a heavy pink bollworm infestation. Included in the collections were strains from Afghanistan, Turkey, Ceylon, India, and Mexico. The different strains varied greatly in the time required to produce pods, although all but 1 strain from Mexico produced pods before frost on October 30. All of the strains with fruit became infested and while there was considerable variation in the degree of infestation, there was such a wide variation in the dates of fruiting that no conclusions could be formed on the relative resistance, or whether any existed, of the different strains. It was noted, however, that certain strains contained very little watery fluid in the pods, whereas others were extremely watery. As a rule the strains with the least water showed the highest infestation, probably because of the heavier mortality among very small larvae in the strains with high water content. Seeds from selfed blooms of the different strains have been obtained for further testing next season. Tests were also conducted at Presidio to determine the age and size of okra pods that become infested with the pink bollworm, and whether immature larvae could complete development when the pods were cut and handled under conditions simulating commercial shipments. Newly hatched first-instar larvae were installed on pods from 1 to 7 days old and the pods removed from the plants after 6 hours. Moths were also confined with caged plants bearing pods of known ages and the pods removed daily after the first 4 days to allow for hatching. The pods of both series were kept at temperatures of 75° to 80° F. immediately after collection, and placed in a cold room at 40° for 2 to 4 days and then removed to a temperature of 75° to 80°. Pods from 1 to 7 days old became infested in both series of tests. Exposure to a temperature of 40° for a period of 4 days did not cause any additional mortality but merely arrested development of the larvae. Pods that were infested by placing newly hatched larvae on the pods showed the heaviest infestation (83 percent) with an average of 1.44 larvae per pod in pods 1 day old. The 7-day-old pods from the plants caged with the moths showed the heaviest infestation (73 percent) with an average of 1.27 larvae per pod. This was to be expected since the 7-day-old pods were exposed to attack over a longer period. Also 2 blooms were found to contain immature fourth-instar larvae in the cages, indicating that in the presence of a heavy pink bollworm population larvae will attack the flower buds of okra. Larvae and adults obtained from the pods 1 and 2 days old were very small, indicating that pods at this age did not contain sufficient food for development of normal-sized individuals. First-instar larvae placed on 3- to 6-day-old pods developed into normal moths, although the pods were collected from the plants about 6 hours after the larvae were installed. It was also noted that most of the larvae pupated in the pods, whereas in cotton most of the larvae leave the bolls before pupation. Some of the larvae had apparently gone into the resting stage within the pods. Measurements showed that pods 1 day after blooming averaged 0.56 inch; 2 days after blooming, 0.86 inch; 3 days after blooming, 1.42 inches; 4 days after blooming, 2.02 inches; 5 days after blooming, 2.58 inches; 6 days after blooming, 3.33 inches; and 7 days after blooming, 4.12 inches. Pods from 1-1/2 to 3 inches in length or from 3 to 5 days old are the most desirable for vegetable use but, since there was considerable variation in the size of pods at the different ages, a commercial shipment would most likely include some pods ranging in age from 2 to 7 days. Larvae in pods of this age and size can complete normal development after exposure to 40°, showing the danger of dissemination through commercial shipments of okra.

Host plants of the pink bollworm.--With the aid of several assistants, supplied by the Division of Pink Bollworm and Thurberia Weevil Control, L. C. Fife has been able to increase the number of inspections in the lower Rio Grande Valley to determine the distribution and importance of malvaceous plants as hosts of the pink bollworm. *Malvaviscus drummondii*, previously reported as a host, has been found to occur rather abundantly in waste places on both sides of the river. Although blooms and seed capsules were present, and although some of the plants were growing near infested cottonfields, no additional infestations in this species have been found. Very few seed capsules of *Hibiscus cardiophyllus* were found that were suitable for pink bollworm infestation, as most of them had opened and had shed their seed. This plant is known to be a host of the pink bollworm, but to date no infestations have been found in the limited number of seed pods examined. A considerable number of seed pods of several wild mallows, including *Abutilon* spp., *Wissadula* spp., *Malachra capitata*, *Sida angustifolia*, and *Hibiscus mutabilis* were examined during November without finding any pink bollworms. By the end of the month drought had seriously affected the growth and fruiting of the plants and very few were found in a suitable stage of growth for infestation. No new infestations were found in seven okra fields inspected during November, but a few pink bollworm larvae in all stages were found in the scattered squares and bolls of cotton present on both sides of the river.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Gin-trash inspection.--Intensive inspection of the trash from cotton as it is ginned is carried on annually at the most opportune time, in regard to the various areas to be inspected, to determine the status of pink bollworm infestation in counties regulated on account of the pink bollworm, and to discover possible incipient infestations in outside areas most likely to be infested. During November gin-trash inspection was concentrated principally in the Texas Panhandle area and in the cotton-growing sections of Arizona. No new infestations were found in the Panhandle area, but several additional specimens of the pink bollworm were found outside of the regulated area in Mitchell County, the first worm being found in that county in October. Inspection was completed in the Panhandle area around the latter part of the month, with a few specimens being taken from several counties already under regulation. Results of inspection carried on within the regulated area indicated a lighter infestation than for the 1938 crop season. During the latter half of November, after a considerable amount of inspection had been done, a recurrence of the pink bollworm was found in Arizona in the Salt River Valley at Glendale and Gilbert, this latter point constituting the heaviest infestation in that district for the 1938 crop season. A light infestation was also found to be present again this season in Pinal, Pima, and Graham Counties, Ariz.

Field clean-up in south Texas and the lower Rio Grande Valley of Mexico.--Field clean-up operations, which have been in progress in south Texas regulated areas for the last several months, were being brought to a close at the end of the period. This is the third clean-up for that area since the discovery of the pink bollworm in the Brownsville-Matamoros area of Texas and Mexico 4 years ago, in an effort to suppress this menace and prevent its spread to other cotton-growing sections. This year, for the first time, funds were made available by Congressional appropriation to pay in part for the destruction of stalks after harvest, and it is believed that a more thorough clean-up was done than has heretofore been possible. During November efforts were being concentrated on removing soca and abandoned cotton, most of which was being taken out by grubbing. The few fields which had been placed in a noncompliance status were also worked by the soca crews as they came to them. The supervisors spent a great portion of their time during the month in contacting operators in regard to the removal of seedling and sprout plants which had developed in fields after payment had been made, encouraging farmers to remove any such plants as might become a menace. Growers continued to cooperate in most instances in removing these stalks; however, a small number refused to do any more work, and in such cases the plants are removed with Bureau labor. Throughout November pink bollworm infestation continued to be found through random boll inspection in a number of fields of soca and abandoned cotton while these plants were being destroyed. The cooperative stalk-destruction work in the lower Rio Grande Valley of Mexico made good advancement during November. Stalks have been cut and plowed on practically all ootton acreage; however, as on the American side, continued contacts with growers are necessary in regard to stub cotton and seedlings which appear after plowing. Some fines were assessed in that area during the period.

Okra infestation in the lower Rio Grande Valley.--Systematic field inspection of okra continued to be made throughout November. For the period, 11 new infestations were found, bringing the total infested fields to 45. Most of the okra fields found to be infested are in Cameron County, only 7 having been found in Hidalgo County. Shipments of okra gradually increased throughout the month, and at the close of the period 83 permits had been issued for the shipment of okra, following inspection of fields showing negative results as to pink bollworm infestation.

Thurberia-plant eradication.--Thurberia-plant eradication work made good advancement in southeastern Arizona during November. The Tortillita Range is now being reviewed in order to locate any mature plants that might have been missed, or to take out such sprout plants or seedlings which may have occurred since this territory was first worked in 1935, at the inception of this project. The decision as to the necessity for removing these plants, as an additional safety measure to the control and quarantine measures already in practice, was reached when it was determined that this native boll weevil was making its way from wild plants to domestic cotton. This work has been carried on principally through Presidential allotments, using W. P. A. laborers. During November a considerable number of seedling and sprout plants were taken from the acreage rechecked.

Wild-cotton eradication in southern Florida.--A number of years ago it was discovered that wild cotton plants, which prevail along the southern coast of Florida, were infested with the pink bollworm, from which this pest was being disseminated to domestic cotton plantings in the Southeastern States. Consequently, an effort was begun to eliminate this wild cotton, which serves as a year-round host to the pink bollworm. A portion of the funds to carry on this work has been provided by W. P. A. allotments, and 12 W. P. A. crews were engaged in eradicating wild cotton plants during November. In addition, 2 crews, composed of Bureau employees, were placed in operation during the period. These last 2 crews carried on eradication work from houseboats, operating in the Ten Thousand Islands and in the Biscayne Bay and Florida Bay sections. First clean-ups for the season were completed during the month in Pinellas, Hillsborough, Sarasota, and Manatee Counties in the Bradenton subdistrict, and in the Keys subdistrict. During the first clean-up this season, 20,000 fewer wild cotton plants were found in the Keys subdistrict than during the first clean-up last season. However, there was an increase in the number of wild cotton plants found in the Bradenton subdistrict, and it is believed this is due to the fact that the wild cotton colonies in that area are, as a rule, small, and have been cleared of all vegetation, which has stimulated the germination of wild cotton seed. Most of the mainland locations were cleaned for the first time in the Fort Myers subdistrict, and the areas which it was necessary to reach by boat were in process of being cleaned at the end of the month. The C. C. C. camp being constructed by the Army at Cape Sable, to aid in this work, was practically completed at the close of the period.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Methyl bromide fumigation controls cyclamen mite.--In a series of fumigations performed by F. F. Smith, of the Beltsville, Md., laboratory, in cooperation with Randall Latta, of the Division of Control Investigations, it was shown that fumigations of cyclamen, delphinium, and snapdragon with methyl bromide killed the cyclamen mite (*Tarsonemus pallidus*

Banks) in all its stages without causing injury to the plants. On the basis of these tests it was concluded that a fumigation treatment of 2 pounds of methyl bromide per 1,000 cubic feet, with an exposure period of 3 hours at a temperature ranging between 60° and 70° F., constitutes the most practical treatment. It is planned, however, to continue these experiments in order to determine the possibility of obtaining an effective control at higher temperatures.

Parasites released to combat lima bean pod borer.--Rodney Cecil, of the Ventura, Calif., laboratory, reports that during last summer a total of 2,153 adults of *Phanerotoma planifrons* Nees. and 11,659 adults of *Chelonus* sp., both of which are imported species of parasites of the lima bean pod borer (*Etiella zinckinella* Treit.), were released in Santa Barbara, Ventura, and San Diego Counties, Calif. These releases were made in dense growths of the tree lupine (*Lupinus arboreus* Sims.), one of the favorite wild host plants of the lima bean pod borer, and in lima-bean fields. In addition to the parasites liberated in the field, a large number of each species was retained to serve as a foundation for future breeding operations.

Allyliothiocyanates or chloropicrin not superior to carbon disulfide as a soil fumigant for wireworms.--In recent experiments R. C. Lehman, of the Walla Walla, Wash., laboratory, found that neither allyliothiocyanate nor chloropicrin, used under field conditions, was as economical nor any more effective than carbon disulfide in killing wireworms in the soil, principally the sugar beet wireworm (*Limonius californicus* Mann.) and the Pacific coast wireworm (*L. canus* Lec.). Experiments with carbon disulfide showed that this material was very effective in killing wireworms in soil during the summer period when used at the rate of ½ ounce (pure or activated) at 1-foot intervals and 1 ounce at 1½-foot intervals. These dosages applied at 2-foot intervals, however, were not as effective as at the closer intervals in the silt-loam soils near Walla Walla.

Starchy grains superior to legumes for feeding wireworm larvae.--During the course of physiological studies, C. E. Woodworth, of the Walla Walla, Wash., laboratory, found that starchy grains, such as wheat and corn, were superior to proteinaceous legumes, such as peas and beans, in promoting the growth of larvae of the sugar beet wireworm and the Pacific coast wireworm. In these experiments the food provided was of three types: (1) Corn and wheat; (2) peas, Navy beans, and lima beans; and (3) living microorganisms consisting of dried brewer's yeast. In the first two of these groups the germ of the seeds was killed in certain lots and not killed in other lots, so that the latter might grow and supply succulent roots. The yeast was included in these dietary tests because several workers had shown that this material is an important dietary supplement and others have shown that humus such as might be produced by the dead yeast and the substrate material is a satisfactory food. Seeds, rather than the purified starches and crystallized proteins were selected because under natural conditions in the soil the molds are very common and the coats of the seed partially prevent their growth until the wireworms actively begin to feed upon the seeds. A lower wireworm mortality ensued from individuals that fed on the seeds where the germs were killed than from those that fed on seeds containing live germs. The grains were found to give better results from a nutritional standpoint than did the legumes.

Under the conditions of the experiment the wheat was found to be slightly superior to corn as a food for wireworms as the larvae that fed on wheat were larger, a greater percentage of them transformed to adults, and a higher percentage of the larvae survived. The peas were found to be superior to either Navy or lima beans as a wireworm food, the rate of growth of the larvae being greater and the percentage of survival at least closely comparable. Yeast was found to be of practically no value as a food for wireworms.

Flight of sweetpotato weevil adults.--K. L. Cockerham and O. T. Deen, of the Sunset, La., laboratory, report that recent observations have led to the recovery of adults of *Cylas formicarius* (L.) at distances ranging from ½ mile to 1¼ miles from the point of dispersal. During the progress of these experiments the adults that had been artificially colored were recovered at trap lights maintained for this purpose. Preliminary observations on the reaction of adults to different colored lights indicated that they exhibited a marked preference for the violet end of the spectrum, then for the blue, orange, red, yellow, and green, in the order named. During 1939 the adults were in active flight throughout the nocturnal period instead of during a short period following dusk, as had been observed during the course of flight experiments in preceding years.

Low acreage of Russian-thistle in San Joaquin Valley.--M. F. Bowen and W. C. Cook, of the Alhambra, Calif., laboratory, report that the annual survey to determine the acreage of Russian-thistle (*Salsola pestifer* A. Nels.) in the southern part of the San Joaquin Valley demonstrated that there was only about one-sixth of the acreage of this favorite wild host plant of the beet leafhopper (*Eutettix tenellus* (Bak.)) present during 1939, as compared to 1938. A total of 14,423 acres of this plant was mapped in the valley, comprising a stand density of 10 percent or over, as compared to 92,418 acres in 1938. The 1939 acreage of this plant is one of the lowest observed in the past 9 years.

INSECTS AFFECTING MAN AND ANIMALS

Effect on sand flies of flooding diked marshes with salt water.--J. B. Hull and S. E. Shields report that during the month of November the tide gates were open the entire time. They were opened by the Sanitary District in October during the heavy rains and high tides, to save the cost of running the pumps 24 hours a day, as this would have been necessary to prevent mosquito breeding, the minnows in the dike ditch in two areas not being numerous enough to take care of the situation. The samples collected since that time have, however, given us an opportunity to check as to whether or not sand fly breeding increases to any great extent in a diked marsh if it is allowed to flood in the fall during a rainy season and when the tides are high. From a total of 28 1-quart samples of soil collected from the undiked marsh, 357 sand fly larvae were isolated. From a total of 25 1-quart samples of soil from the diked marsh, 14 sand fly larvae were isolated. From 18 1-quart samples collected from points previously sampled, 1 sand fly larva was isolated. This is approximately the same larval population shown by soil samples as was found prior to the flooding of the marsh and indicates that it may be possible to allow the diked marshes to flood during the heavy-rain and high-tide season in the fall without increasing the sand fly population. This would save considerable pumping, which decreases the cost of a diking control project.

Buffalo gnat outbreaks may be affected by flood-control project.--During the last week in November, W. V. King and G. H. Bradley visited the Sardis dam and reservoir site near Sardis, Miss. This is a flood-control project on the Little Tallahatchie River and will be completed in time for water storage this winter. We were told that the reservoir has sufficient capacity to control completely the floods on this river and to have some effect on the confluent rivers in the upper Yazoo Valley. The impoundment may therefore be of considerable benefit from the standpoint of *Simulium* outbreaks. Observations were also made in the reservoir area of the work being done to reduce future anopheline breeding. This consists principally of the complete clearing of the lower portions of the area, with supplemental marginal drainage of depressions.

FOREIGN PARASITE INTRODUCTION

European parasite laboratory closed.--Owing to war conditions in Europe, it has been found necessary to close the laboratory at St. Cloud, France, for an indefinite period. This laboratory was originally established at Hyeres, on the Mediterranean coast, in 1924, under the direction of W. R. Thompson, for the study of the European corn borer and its parasites. H. L. Parker became head of the laboratory in 1928, and has served in that capacity ever since. In 1934 the laboratory was transferred to the newly organized Division of Foreign Parasite Introduction and thereafter conducted all of the Bureau's work on parasite problems in the European and Mediterranean regions. Mr. Parker and P. A. Berry will leave in the near future to undertake similar work on a series of problems in South America, and H. D. Smith has been assigned to the receiving station at Moorestown, N. J.

FOREIGN PLANT QUARANTINES

Plant material handled at Washington, D. C., Inspection House.--During the month of October 240 lots, representing 1,145 containers of various kinds of plants, bulbs, and other material, exclusive of mail shipments, passed through the Washington, D. C., Inspection House. Some form of treatment was given to the plant material in 791 containers as a condition of entry and 354 were released after inspection, without treatment. This represents a very considerable increase over October 1938, when similar importations consisted of 409 containers, 241 of which were treated as a condition of entry.

A locked auto trunk.--A local resident returning from Mexico assured the plant-quarantine inspector at Brownsville, Tex., that she had no flowers and had no key to the locked trunk on her car, but ultimately he obtained the bunch of keys hanging from the ignition key and found 300 chrysanthemums and 2 floral wreaths in the trunk. The flowers were heavily infested with thrips and 8 other kinds of insects were found, including 2 kinds of chrysomelids, 1 cicadellid, 2 aphids, 3 larvae of *Homoeosoma* sp., 1 neuropterous larva, several geometrid larvae, and 1 mirid, apparently *Lygus apicalis* Fieb. An administrative fine of $5 was assessed by the customs inspector.

Entomological interceptions of interest.--A living larva of the Mexican fruitfly (*Anastrepha ludens* Loew) was intercepted at Laredo, Tex., on September 10, 1939, in a peach in baggage from Mexico. A living adult of the chrysomelid *Diabrotica speciosa* (Germ.) was taken at New York on March 30, 1939, on packing for plums in cargo from Argentina. A living larva of the pyralidid *Myelois venipars* Dyar was found at Hidalgo, Tex., on July 6, 1939, in an orange in baggage from Mexico. Living specimens of the cicadellid *Eupteryx melissae* Curt. arrived at Philadelphia on July 28, 1939, on the cut stems and leaves of sage in the mail from England. Specimens of the scale insect *Aspidiotus fabernii* Houser were taken at the airport at Miami, Fla., on July 16, 1939, on an unknown plant in baggage from Cuba. A living adult of the chrysomelid *Calligrapha diversa* (Stal) was intercepted at San Francisco on March 20, 1939, on orchid plants in the mail from Mexico. A living specimen of the pink bollworm (*Pectinophora gossypiella* Saund.) was found at Brownsville, Tex., on August 21, 1939, in okra in baggage from Mexico. A living specimen of the lygaeid *Cryphula fasciata* (Dist.) arrived at Galveston, Tex., on August 3, 1939, on banana debris in cargo from Guatemala. Living specimens of the scale insect *Chionaspis humilis* Brain were taken at Washington, D. C., on June 10, 1939, on a plant (*Haworthia*) in the mail from Southwest Africa. Three living larvae of the West Indian sweetpotato weevil (*Euscepes postfasciatus* Fairm.) were intercepted at Norfolk, Va., on July 19, 1939, in a sweetpotato in ship's stores from Dominican Republic.

Pathological interceptions of interest.--*Aphelenchoides parietinus* Bast. and *Aphelenchus avenae* Bast. were intercepted on November 16 at New York in *Fritillaria imperialis* bulbs from Holland. *Aspergillus alliaceus* Thom and Church was intercepted at New York on November 24 on cipollino bulbs from Morocco. *Claviceps paspali* Stevens and Hall was intercepted at New York on November 16 in paspalum seed from Colombia. *Coryneum foliicolum* Fckl. and *Gloeosporium fructigenum* Berk. were intercepted November 2 at New York on pears in airplane baggage from France, *Kuehneola malvicola* (Speg.) Arthur was intercepted on *Hibiscus syriacus* from Mexico on June 24 at Brownsville. *Leptothyrium rubi* Sacc. was found February 2 and April 19 at New York on *Rubus* leaves in stores from France. *Mycosphaerella lythracearum* Wolf was intercepted at New York on October 24 on pomegranates from Puerto Rico. *Peronospora trifoliorum* de Bary was intercepted at El Paso on October 25 on alfalfa from Mexico. *Septoria dianthi* Desm. was intercepted on November 9 at New York on a carnation plant from Italy and on carnation cuttings from Italy on November 23. *Septoria malvicola* Ell. and Mart. was intercepted on July 1 at New York on leaves of *Malva rotundifolia* in mail from Rumania. *Septoria organicola* var. *majoranae* Bres. leaf spot was intercepted on marjoram leaves from Canada at Blaine on July 14. The determination was tentative since no authentic material is available in the Department's collections for comparison. *Uredinopsis macrosperma* (Cooke) Magn. was the tentative determination for a rust found on November 1, at Brownsville on *Pteridium aquilinum* (fern) in baggage from Mexico.

DOMESTIC PLANT QUARANTINES

Survey of infestations of new alfalfa weevil.--Scouting for the new species of alfalfa weevil, *Hypera brunneipennis* Boh., in Yuma County, Ariz., and vicinity, was begun in December, under the direction of W. E. Dove and in the direct charge of H. T. Rainwater, both of the grasshopper control project. A headquarters office is being established at Yuma.

Fall-grasshopper-survey indications.--Data on probable infestations of grasshoppers in 1940, as indicated by the recent fall survey of egg beds and by observation of adult infestations, have been completed. In States where the indications are that infestations will be light in 1940 the bait estimates, as calculated from survey data, were mailed to State leaders, requesting their approval or suggestions for reasons for raising or lowering bait estimates in specific counties or areas. In States where heavy grasshopper populations are expected in 1940, the State leaders attended meetings with the project leader and other Federal agents, in the Minneapolis office, where the bait estimates were adjusted in accordance with records of previous bait uses, types of crops involved, weather, and other factors. The tentative bait estimates agreed upon are being reviewed in the Washington office before estimates are made final.

Grasshopper infestation in 1940 will be lighter.--The information derived from the recent fall grasshopper survey indicates that the need of control measures in 1940 will be less in extent than was the case in 1939, although heavy baiting requirements are expected in the northeastern and southwestern parts of the Great Plains area. The principal area for control of migratory species is in the north-central part of Montana, adjacent to the Canadian border, where grasshoppers that flew from the heavily infested portion of eastern Montana in 1939 concentrated. The egg-survey data indicated that *Dissosteira longipennis* Thos. is sufficiently numerous to necessitate organized control in 1940 only in New Mexico and in Colorado. Most of the egg beds of this species have been surveyed and marked and it is expected that, contingent on the appropriation of funds, control can be established early in the season with only a fraction of the amount of bait and expense involved in the 1939 campaign against this species. The survey also indicated an extension of infestation of *Melanoplus differentialis* Thos. as far north as some of the southern counties of North Dakota. In general, areas in North Dakota and Montana which were heavily infested with *M. mexicanus* Sauss. in 1939 have only normal or below-normal populations of the species remaining for the 1940 infestation. It is believed that areas heavily infested with *M. mexicanus* in 1940 will, in general, be in the more thickly populated, more intensively farmed districts, with the exception of areas in eastern Colorado, western Kansas, and the Oklahoma Panhandle, where this species seems to be increasing, constituting the possibility of reaching flight proportions in 1940.

Grasshopper control headquarters moved.--The moving of the office equipment and personnel of the grasshopper control headquarters from Minneapolis to Denver will be completed in December and it is expected that the Denver office will be opened on January 2.

Mormon cricket survey.--At the conclusion of the 1939 Mormon cricket control season and at the time of egg laying, a survey to determine the extent of adult cricket infestation was conducted. In the adult survey, supervisors plotted on county maps the location and extent of bands of crickets at the time of egg laying, and classified the bands, according to uniform methods, as heavy, moderate, or light. In each area so determined to be moderately or heavily infested, egg samples were collected somewhat later in the season, and data as to the probable concentration of the 1940 hatch were obtained by determining the density of egg deposition. Data in each State have been obtained for both heavy and moderate infestations within 5 miles of agricultural lands, and for heavy, moderate, and light infestations on both range and agricultural lands. It was determined that the infestations in the fall amounted to 2,145,765 acres of heavily and moderately infested land within 5 miles of agricultural lands, as compared with 4,298,788 acres in the fall of 1938. The total number of acres lightly infested in 1939 was 10,507,365, a slight increase over that reported in 1938. Results of the adult survey indicate that there has been a considerable decrease in infested areas in northern Wyoming and southern Montana, and an increase in infested areas in northern Nevada, southwestern and western Idaho, and in Oregon.

White-fringed beetle control work in November.--Because of the scarcity of white-fringed beetles in all of the areas, little inspection activity was carried on in November. A few live beetles are still being found, however, in southern Mississippi and at New Orleans. A survey unit was recently set up to determine the larval population existing in December in the various areas. Infested properties and land adjacent to infestations in Pensacola, Fla., and Mobile and Florala, Ala., are being cleared by W. P. A. workers in preparation for the 1940 control work. In the New Orleans area owners of nurseries and greenhouses are continuing with the construction of certified units for plunging nursery plants and there has been a continuous call for sterilized soil. A number of nurserymen and florists have disposed of uncertified plants in order to handle only certified plants that have been plunged in the approved unit. At Baton Rouge and New Orleans, a large number of azaleas and camellias were recently fumigated with methyl bromide solution, in accordance with regulatory instructions.

White-fringed-beetle-control program for 1940.--At a conference held on November 1 and 2, at Pensacola, Fla., attended by representatives of this Bureau and of cooperating States, a tentative program for control and eradication of the white-fringed beetle was discussed. The aim for 1940 is to develop cropping programs with growers in infested areas, thus permitting clean-culture operations during June, July, and August. On properties for which releases are not obtained and on which the planting of small grains is not practicable, crops which lend themselves to the application of control measures are recommended.

Phony peach and peach mosaic disease control.--The former limiting restriction on the use of emergency-relief funds allotted to the Bureau for phony peach and peach mosaic control to the effect that no work is to be performed in commercial orchards and nurseries, has been lifted, and the tree-removal work was thereby increased in November. In Georgia 23,000 phony trees are being rapidly removed by such labor and many blocks of abandoned peach trees are being taken from the orchards in the infected area of Colorado.

Sweetpotato weevil control work.--During the month of November, inspections for sweetpotato weevil were made of seedbeds, fields, and storage places on 2,830 properties in Alabama, Georgia, Mississippi, and Texas. Eradication measures were continued in Baldwin and Mobile Counties, Ala., Thomas, Camden, and Glynn Counties, Ga., Pike, Walthall, Marion, Lawrence, Jefferson Davis, Jones, Covington, Stone, and Pearl River Counties, Miss., and Gregg, Shelby, Nacogdoches, and Cherokee Counties, Tex. Eighty new infestations were found. No weevils could be found in Gregg and Shelby Counties, Tex., and it now appears that the infestations in these counties are approaching eradication.

Citrus canker eradication.--The reworking of old infected properties in Harris and Jefferson Counties, Tex., was resumed in November. Most of the citrus trees found in the city of Houston are dooryard trees of satsumas, kumquats, lemons, grapefruit, and orange seedlings, and occasional small groves of satsumas. Hedges of *Citrus trifoliata* are used either for fences or for ornamental purposes. In the more exclusive residential districts, such hedges are used in the landscape plans of the estates and in such cases it is very difficult to obtain permission to destroy them. The citizens as a whole, however, are very cooperative.

Pittsburgh inspectors intercept shipment containing larvae of Japanese beetle and rose chafer.--In the inspection of an uncertified shipment of two trees shipped by a commercial consignor near Baltimore to a point outside the Japanese beetle area, transit inspectors at Pittsburgh, on making an examination to determine the character of the packing, found that one of the trees was packed in soil infested with two larvae of *Popillia japonica* Newm. and four larvae of *Macrodactylus subspinosus* (Fab.). The interception was made on October 10 by John T. Bigham.

Quarantine infringements reported.--During November transit inspectors reported 167 infringements of domestic Federal quarantines, including 2 violations of the white-fringed beetle quarantine--1 being intercepted at Atlanta and the other at New York. Japanese beetle inspectors are being assigned to assist in quarantine enforcement at Philadelphia, Pittsburgh, New York, and Boston during the Christmas shipping season.

CONTROL INVESTIGATIONS

Buffer capacity of the hemolymph of Prodenia eridania.--The buffer capacity of the blood of the southern armyworm (*P. eridania* Cram.) has been determined in the Beltsville, Md., laboratories by Frank H. Babers. The blood is well buffered, having a buffer capacity of 0.022 at pH 6.65, as compared with the value 0.0228 at pH 7.4 for human serum. The pH of the blood of larvae kept overnight at room temperature, in an atmosphere saturated with nicotine vapor, did not change. It is thought that the buffering power of the blood is due to the presence of carbonates, bicarbonates, phosphates, amino acids, urates, and salts of the proteins.

INSECTICIDE INVESTIGATIONS

Nobel prize in chemistry awarded former workers on rotenone and pyrethrins.--The Nobel prize in chemistry for 1939 has been divided between Professor Adolf Butenandt, director of the Kaiser Wilhelm Institute for Biochemistry at Berlin-Dahlem, and Professor Leopold Ruzicka, of the Technische Hochschule, Zurich, in recognition of their work on hormones. This announcement in Science of November 17, 1939, is of interest to entomologists as well as to chemists having to do with insecticides, because Dr. Butenandt was one of the early workers on the structure of rotenone and Dr. Ruzicka was the first to determine the structures of pyrethrins I and II, the active principles of pyrethrum flowers. It is of interest to know that F. B. LaForge, H. L. Haller, and Lloyd E. Smith, of this Division, were working on the structure of rotenone at the same time Dr. Butenandt was and the American workers were successful in solving this very difficult problem first. Messrs. LaForge and Haller have recently reinvestigated the structures of pyrethrins I and II and have slightly modified the findings of Dr. Ruzicka. A series of papers describing these researches is now being published.

New particle-size survey of sulfurs in progress.--A survey of average particle-diameters of powdered sulfurs produced commercially for insecticidal use is being made by E. L. Gooden. In this survey is employed a new apparatus (News Letter vol. VI, No. 9, p. 32) designed to indicate directly the surface-weighted average diameter of any sample, rather than its size distribution. This average diameter, being inversely proportional to specific surface, is one of the best indices to those properties of a powder which depend on fineness, and thus constitutes one of the simplest and most logical bases for comparison of samples with regard to particle size. Results accumulated to date (involving 35 samples) in the current sulfur survey show averages distributed almost continuously throughout the range from 5 to 28 microns. Incidentally, the surface-weighted average diameter, when expressed as here in microns, may be thought of (with certain theoretical provisions) as numerically equal to the actual volume in cubic centimeters of material required to cover a square meter of surface.

BEE CULTURE

Toxicity of insecticides to honeybee varies with concentration.--L. M. Bertholf, of Western Maryland College, has found in the cooperative study on the effect of insecticides on honeybees that, of two doses containing the same total amount of lead arsenate and calcium arsenate but varying in concentration, the one containing the more highly concentrated suspension is more toxic to honeybees than is the one containing the lesser concentration. He also reports that it seems probable that phenothiazine, in dosages covered by his observations, has no toxic effect that can be detected by the methods used, this in spite of the fact that the largest doses given were probably much larger than a bee would ordinarily get by sucking up a load of the regular spray mixture. He has further found that tartar emetic is toxic to bees and that median lethal dose lies between 12 and 24 micrograms per bee. This corresponds to about 4 to 8 micrograms of antimony.

Improvement found in stock under test in American foulbrood resistance study.--A. P. Sturtevant, of the Laramie, Wyo., laboratory, reports that during the summer 62 colonies were tested for their resistance to

American foulbrood by giving them sirup containing measured dosages of the causative organism, Bacillus larvae. Five additional colonies were tested by spraying their brood with material containing spores. Two strains stood out from the others in the tests but an F_3 generation of a strain that was considered one of the best last year gave the poorest record of indicated resistance of any stock tested this year. Another strain which in the F_1 generation gave only a fair record last year gave excellent results this year in the F_2 generation, apparently as a result of selective line-breeding. This year's generation of four other strains tested last year gave results quite similar to those previously obtained with these strains. There were apparently instances of hybrid matings in some of the stock used this year. Nervousness of bees and spotted nature of brood nests were again noted in strains that showed these characteristics last year.

Multiple matings of queen bees occur oftener than is popularly believed.--Although many competent observers have long reported the fact that queen bees mate more than once before beginning to lay eggs, this fact has never received common acceptance among beekeepers. Last year the occurrence of this pehnomenon was observed by Bureau workers both at Beltsville, Md., and at Baton Rouge, La. Observations at the latter place by E. Oertel last year and by Otto Mackensen and William C. Roberts this year indicate that this pehnomenon is of much commoner occurrence than has been suspected. Thus in a recent report of the work by Mackensen and Roberts it was stated that of 40 queens observed this year 19 mated twice and that perhaps 3 others could be placed in the same category although the evidence was not clear. The following additional data in regard to the 19 queens are quoted from this report: "Between their first and second matings, 2 made 1 flight and 1 made 2 flights. No flights were observed after the second matings. The average length of preliminary flights before mating was 9.7 minutes. The average length of first and second mating flights was 12.1 and 10.0 minutes, respectively. The average length of flights between matings was 7.2 minutes. In 17 cases the second mating took place on the day following the first, and in only 2 cases, S-76 and S-82, did it occur on the second day. Queen S-76 flew twice on the day between matings while queen S-82 did not fly. In the last case, the day was windy but queens were flying about as usual."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

A significant addition to collection of coleopterous larvae.--Recently there has been added to the National Collection a larva of Endecatomus reticulatus (Hbst.). This, according to W. H. Anderson, is the first known larval representative of the tribe Endecatomini, family Bostrichidae. The adult beetles of this tribe are, apparently, rather divergent from the remainder of the family, so much so that E. A. Schwarz believed them wrongly placed. However, from the larva it appears that Endecatomus is a true bostrichid and should be considered intermediate between the Dinoderinae and the Psoinae.

The tropical bedbug in Florida.--Mrs. Thomas R. Brown, 330 Hayes St., Hollywood, Fla., submitted for identification a specimen of a bedbug which was determined by H. G. Barber as the tropical bedbug (Cimex hemipterus (F.)). Apparently this is the first notice of the appearance of this bug in the United States. It was described from South America and is now known to occur all over the warmer parts of the world. It probably reached Florida by way of the West Indies, where it is a common species.

Important addition to aphid collection.--An exceedingly valuable collection of aphids has been received from E. O. Essig, of the University of California, as a gift to the Bureau. This consists of slide-mounted material representing 117 species, mostly European, assembled in the course of Professor Essig's European visit 2 years ago. The entire lot can be considered authentically named, many of the items having been identified upon comparison with types in European collections. Included are also paratypes or cotypes of certain species described by Professor Essig. As the identity of a considerable number of the species has previously been unknown to us, owing to the lack of authoritatively determined material, the collection will be of appreciable assistance in the aphid identification work of the Division.

Consideration of problems in entomological nomenclature.--The frequency with which perplexing nomenclatorial problems are encountered in taxonomic work, and the need for some readily available review body, have led to the establishment of a committee within the Division of Insect Identification to consider difficult cases arising in the course of the Division's normal activities. The function of this committee is to review such problems thoroughly on the basis of the facts submitted and to interpret the application of the International Rules to the cases in question. It is recognized that in some cases the committee will undoubtedly be unable to render definite opinions that may safely be followed and will be forced to recommend submission to the International Commission of Zoological Nomenclature. However, most of the questions to be offered can probably be satisfactorily decided by this body, thus making unnecessary their reference to the International Commission and providing relatively promptly a basis for sound procedure. Various workers in other research divisions of the Bureau are doing more or less taxonomic work and no doubt are sometimes confronted with questions of nomenclature that are not easily decided because of lack of facilities or unfamiliarity with certain interpretations that have been published by the International Commission. If such workers care to submit problems of this kind to the Division of Insect Identification, the committee on nomenclature that has been set up in that unit will be glad to consider them and to recommend the procedure which, in its judgment, seems to represent correct interpretation of the International Rules.

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FRUIT INSECT INVESTIGATIONS

Project for suppression of pear psylla in Northwest.--The finding in the Spokane, Wash., area of the pear psylla, an insect previously known to occur only in the northeastern part of the country, was reported in July. Surveys conducted in the Northwest have shown that the insect occurs only in the Spokane Valley area of Washington and Idaho. In order to prevent this insect from finding its way to the main commercial pear-producing sections of the West coast and to eradicate it from that area if possible, the Bureau is undertaking a control campaign in cooperation with the State agencies in that area. An initial allotment of $25,000 has been made by the Department from the appropriations for the control of incipient and emergency outbreaks of insect pests. This allotment will provide for the necessary expenditures for starting the work and for some of the needed equipment. The situation seems favorable for the control of the insect, as the distance to the large commercial plantings of pears is 100 miles or more and the intervening areas are mountain or desert. The fact that the pear psylla is very restricted in its food habits is another very favorable factor. Not more than about 10,000 trees are involved in the present known infested area. James F. Cooper, of the Spencer, N. C., Japanese beetle laboratory, is being transferred to Spokane to take immediate charge of the work.

MEXICAN FRUITFLY CONTROL

Fruitflies show increase.--More Mexican fruitflies were trapped in December than in any other similar period during the last 3 seasons. In December 1937, 11 adults were taken; in 1938, 8; and in 1939, 16. The number and variety of other flies also increased this past month. Specimens of 10 species in the genus *Anastrepha* were submitted for identification. Among these 1 unnamed species was represented by 9 specimens from 9 locations, *A. striata* Schin. was trapped in 3 groves, *A. chiclayae* Greene on 37 properties, and a total of 2,003 *A. serpentina* Wied. was taken from 373 trap locations. Fruit movement and certification activities reached a new high point in the history of this project. Through December 31 11,412.4 equivalent carloads of citrus fruits had been certified for movement from the regulated area. This amount is almost 8,000 carlots in excess of shipments to the same date in the 1935-36 season and is greater than any other entire season's production before 1936-37.

CEREAL AND FORAGE INSECT INVESTIGATIONS

European corn borer survival in hybrid sweet corn.--Morris Schlosberg, Toledo, Ohio, reports that field-plot tests of four single-cross strains of sweet corn, each having Michigan 1828 as a common parent, and including Spanish Gold and Golden Cross Bantam for standards of comparison, resulted in the differences in borer survivals among the strains being no greater than would be expected from the effects of measured variables and random variability, the resistance of 1828 failing to show in the hybrids tested for this one season of test.

Isolation of homozygous single- and multiple-generation strains of European corn borer.--K. D. Arbuthnot, New Haven, Conn., in reporting on the progress of his investigations of different strains of the European corn borer, indicates that apparently a homozygous single-generation strain of the borer has been isolated from laboratory rearings, whereas rearings of successive generations of multiple strains have been accomplished only with considerable difficulties. All except one multiple-strain line have been lost after three or four successive generations, owing to failure to obtain mated pairs, nonproduction of eggs by mated moths, or all of the eggs produced being infertile.

Second generation of European corn borer in Lake States.--A. M. Vance, of the Toledo laboratory, submits the following information, provided in part through cooperation with the State Conservation Department of Indiana and the Agricultural Experiment Station of Geneva, N. Y.: Some evidence of midsummer pupation of the corn borer was found in 22 of the 35 counties surveyed in Indiana in the fall of 1939. Such pupation was noted in 11 of the same counties in the fall of 1938. The average pupation for the region, according to the fall-survey data, increased from 0.7 in 1938 to 2.6 in 1939. Immature borers, presumably of a second generation, were observed in 30.4 percent of the 787 fields surveyed in Indiana in 1938 and in 32.4 percent of the 794 fields examined in that State in 1939. Although the presence of 2 generations of the borer annually was noted in all 35 counties surveyed in Indiana in 1938 and 1939, it was most pronounced in the 11 counties of Randolph, Delaware, Blackford, Wells, Jay, Whitley, Huntington, Allen, Adams, Wayne, and Noble in the eastern part of the State. Here 68 percent of the fields examined, in the above 2 years combined, were infested to some extent by a second generation of the insect. Near Toledo midsummer pupation among 2,077 specimens of the borer, examined in 25 fields of early sweet corn in 1939, averaged 11.8 percent, as compared with 11.3 percent found in an examination of 4,398 individuals in the same number of similar fields in the locality in 1938. Evidence of midsummer pupation was also obtained in 14, or 23.7 percent, of the 59 counties of Ohio surveyed in the fall of 1939. Within 12 comparable counties in the northwestern part of the State such pupation averaged 1.7 percent in 1939, as compared with 0.9 percent in 1938. Scattered records of a second generation of the borer were obtained in 5 counties of western New York during the fall survey of 1939 and an appreciable second generation occurred during the summer in the Hudson River Valley and on Long Island.

JAPANESE BEETLE CONTROL

Extend validity period of Japanese beetle quarantine certificates.--Class I (uninfested) nurseries and greenhouses in the Japanese beetle regulated area were notified late in December that beginning January 1, 1940, certificates issued to them would bear the void date of June 30, 1940, and that they would not be called upon to account for the usage of their certificate supply until the expiration of the void date. Periodic check-up visits will, of course, be continued to these establishments as heretofore to assure that adequate records are being maintained. Heretofore certificates have been supplied to these establishments on a monthly basis, valid only to the end of the month. This has resulted in a considerable waste of certificates when shippers have overestimated their needs for the current month. To conserve the certificate supply, an extended void date was proposed. This was approved by the Chief of the Bureau. This revised procedure has met with a very favorable reception on the part of the shippers affected since it will reduce to a minimum the reporting routine involved in their use of Japanese beetle quarantine certificates. Class III or infested establishments are not accorded the same privilege, as certificates are issued to them only for stock that is soil-free or has been grown, treated, or fumigated under specified conditions.

Japanese beetle regulatory activities in New Jersey.--December certification of plant material for shipment from New Jersey to points outside the regulated area was nearly doubled, as compared with that in 1938. Methyl bromide fumigation continued to gain popularity in the State, with 11 establishments now operating their own fumigation chambers. Approximately 300,000 plants have been fumigated in the State since this procedure was authorized. Until about December 20, New Jersey inspectors were busy with the certification of greenhouse plants moving in the Christmas trade. Prices in general were reported as better than in 1938. Open weather early in December permitted nurserymen to dig stock for storage and early spring delivery. Roses in carlots started to move from New Jersey establishments to southern points almost a month earlier than usual. Growers reported a good market for dormant roses in the Southern States. Small fruits, such as raspberries, apparently were in considerable demand in the Carolinas. An inspector supervising the washing of soil from the roots of 500 hydrangeas counted over 1,200 Japanese beetle grubs which were washed out during the soil-freeing operation.

Violation questionnaire detours by way of China.--On October 14, 1937, a transit inspector of the Bureau intercepted a parcel-post shipment containing one potted sedum plant destined from Lewisburg, Pa., to Manitou Springs, Colo., without the required Japanese beetle quarantine certificate. Upon receipt of the inspector's report at the divisional field headquarters a questionnaire form was mailed to the consignor requesting details of the shipment and informing him of the quarantine regulations. No return of the form having been received, a second request was later mailed. Not until early in December 1939 was a reply received. It came from the consignor, now a medical missionary at the American Presbyterian Mission at Kiulungkiang, Yunnan, China. The envelope had been opened by the censors and was resealed with a strip labeled, "Controle Postal Militaire."

Incidental benefits from methyl bromide fumigation reported.--A large hydrangea grower in the Baltimore, Md., area who has constructed a methyl bromide fumigation chamber to meet Japanese beetle quarantine requirements, claims that all of his stock is benefited by this fumigation. Not a single complaint has been received from any of his customers. His specialty hydrangea, a patented variety, does exceptionally well after fumigation, as the larger plants drop their leaves about 7 days after being gassed. Consequently, they do not have to be transferred to cold storage to accomplish this defoliation. He can therefore prepare plants much earlier for spring show purposes. A report from the field supervisor in the Harrisburg, Pa., district states, "One of our shippers equipped with a methyl bromide fumigation box is using it for fumigating plants for pests other than Japanese beetles and thinks it a fine thing to have."

Fire hose needed to free soil from veneer logs.--Two carloads of walnut logs with stumps attached were certified at Conowingo, Md., for shipment to a veneer establishment at Mooresfield, W. Va. Conowingo is in one of the most heavily infested sections of Maryland and both cars and logs were inspected for Japanese beetle to prevent infested material being carried out of the infested zone. Owing to the condition and nature of the soil adhering to the roots it was necessary to use a fire hose to make the shipment soil-free and eligible for certification.

Speeding-up corn borer life cycle.--In cooperation with the Division of Control Investigations, staff members of the New Jersey district office at White Horse have installed incubation cages in the greenhouses to hasten the life cycle of the European corn borer. It is desired to obtain data before winter is over concerning the effect of methyl bromide on the eggs, larvae, and pupae of the borer. Chrysanthemums, gladiolus, and potatoes are being grown for host plants for the various stages of the insect. If methyl bromide fumigation is effective in killing these stages of the borer, plants fumigated with this material in conformity with Japanese beetle quarantine regulations will be eligible for joint certification under both Federal Japanese beetle and State European corn borer regulations. Later field tests of normally reared borers will be made to confirm results with the forced generations.

Gypsy moth infestation found in trees returned to regulated area.--Inspectors operating in the New York City wholesale cut-flower market during the Christmas holidays discovered a truckload of Christmas trees that the driver stated had been cut in the generally infested gypsy moth area. Consequently, they were not eligible for movement from the regulated zone. Return of the trees to the infested area was ordered. When the driver reported to the district inspector at Westerly, R. I., for identification of the load as to point of origin and for possible inspection, the driver stated that the trees originated in Waterville, Maine, in the generally infested area, from which Christmas trees may not be certified. Later, the driver claimed that the trees had been obtained in Bingham, Maine, a point outside the regulated area. As a preliminary measure, the district inspector examined 6 of 75 bundles on the load and in these he found 6 gypsy moth egg clusters. As the trees obviously had been cut in the generally infested area and contained numerous egg masses, further inspection was refused. The driver was required to dispose of them within the generally infested zone.

Increase in Christmas-tree inspection.--A combination of increased business and ideal weather conditions during the Christmas-tree cutting and inspection season, November 1 to December 23, contributed to an increase in the quantity of trees inspected, as compared with the previous season. This year 448,246 Christmas trees were inspected in the lightly infested gypsy moth area. This was more than a 30-percent increase over 1938, when 343,398 trees were similarly certified. Weather conditions were unusually favorable for inspection of both Christmas trees and greenery this year. Only 1 gypsy moth egg cluster was removed from a Christmas tree in connection with this year's inspection activities.

Bough-lot inspection in southwestern Vermont shows increased infestation.--Scouting in bough lots in the lightly infested area of southwestern Vermont showed a heavy increase in gypsy moth infestation, as compared with that found in 1938. In the towns of Dover, Halifax, Wilmington, Whitingham, Readsboro, and Searsburg, Vt., 23 bough lots were found infested with a total of 65 egg masses. It was necessary to make actual inspection of many tons of boughs from infested lots. About 95 percent of these were spruce boughs cut from 3 to 4 feet in length and put up in 100-pound bales. The principal markets to which they were shipped were St. Louis, Mo., and New York City. In the course of the entire season's piece-by-piece inspection of evergreen boughs throughout the lightly infested area, 295 gypsy moth egg clusters were removed from 28,620 pounds of material examined prior to its use in making wreaths.

Arts and Crafts course increased small greenery inspections.--A report from the district inspector in the Bangor, Maine, district states that shipments of Christmas greenery were stimulated by a State program of the Arts and Crafts group. Included in this program was instruction in the manufacture of wreaths, garlands, and centerpieces. Demonstrations and talks were given in small centers and rural hamlets where materials were easily procured. Many of the learners desired to ship their products to points outside the gypsy moth regulated area, thereby necessitating additional travel by the inspector over secondary roads and increasing the number of small lots of material certified.

Gypsy moth infested maple logs.--One unusual inspection during the month involved the examination at Windsor, Vt., of a carload of large maple logs cut at Cornish, N. H., and consigned to a manufacturing company in Millville, N. J., for finishing into rollers for millwork. Most of the logs were from 4 to 5 feet in diameter and from 12 to 16 feet in length. From three of these logs, seven gypsy moth egg masses were removed.

Elm infected with Dutch elm disease changes local objective from elm sanitation to clear-cutting.--With the finding of an infected elm in a beaver swamp in Crawford Township, Orange County, N. Y., extensive elm-sanitation operations begun there last summer were changed to a program of making this an elm-free area. Crews have been working there for months under adverse conditions, attempting to remove all elms infested with elm bark beetles and all elms likely to become infested. About 1,500 elms were in the swamp at the time permission was obtained for the sanitation work. Many of these were in water up to depths of 5 to 6 feet. The recent confirmation, a 12-inch D. B. H. tree, was standing in 3 feet of water. Upon removal it was found infested with Scolytus multistriatus Marsh. There had been some emergence of the beetle from the tree. Indications were that it was infected with the Dutch elm disease fungus during the summer of 1939. The beaver swamp from which this tree was removed is full of elms literally riddled with S. multistriatus. Raising of the water level because of the beaver swamp has caused many of the trees to die. Crawford Township is near the border of the infected zone. The first infections were found there in 1939. Six confirmations have been reported from the township to date. The nearest previous confirmation is 2 miles to the southwest. There are two confirmations to the north of the swamp infection. It is planned to clear this swamp of elms this winter.

Autogiro relicensed.--On December 15 the Division's 420-hp. Pitcairn autogiro N.C. 2740 was inspected and relicensed by the Civil Aeronautics Authority for the next 12-month period. At the same time the only two pilots remaining on the Division's payroll were granted 3-S rotorplane ratings, which entitled them to operate single-engine autogiros with gross weights between 4,000 and 10,000 pounds, the classification of N.C. 2740. The other four Bureau-owned autogiros do not require relicensing at this time. Autogiro N.C. 11612, owned by the Division of Gypsy and Brown-Tail Moth Control, stopped at the U.S.D.A. airport at Preakness, N. J., on December 10 for temporary storage while en route from Texas back to its Massachusetts field base.

Rain and snow permits burning.--Snow and rain in mid-December were a decided advantage to the Dutch elm disease eradication program, in that they eliminated fire hazards and permitted the crews to do a large amount of clean-up work by burning accumulated wood piles.

Dutch elm disease infection reduced in Union County, N. J., parks.--According to the annual report of Ralph H. Carver, chief plantsman of the Union County Park Commission, only 83 diseased elms were located and removed from parks under the supervision of the County Commission during 1939. This was 80 percent fewer than the number destroyed in 1938. The eradication campaign in the parks also included the removal of 553 noninfected but dead and dying elms.

First-record infections.--Two first-record infections were removed during the month, both located in Warwick Township, Bucks County, Pa. These new cases add another township of 11.5 square miles to the infected zone, increasing to 698.61 square miles the area infected in Pennsylvania.

Correction.--In the December 1, 1939, issue of the News Letter, on page 4, under the heading, "Dual-purpose inspection," the disease reported as "red seal" should read "red stele."

FOREST INSECT INVESTIGATIONS

Tests with sprays to prevent breeding of smaller European elm bark beetle.--R. R. Whitten, Morristown, N. J., reports that as a result of a limited demand for a spray to prevent *Scolytus multistriatus* Marsh. from breeding in elm wood, experiments were conducted from 1936 to 1939 with various materials. Six formulae ranging in cost from $0.218 to $0.688 per gallon were found to effectively repel *S. multistriatus*, *Hylurgopinus rufipes* Eich., and certain cerambycids for the entire active season when applied in May. They were also found to considerably reduce the amount of attack when applied from September to April, inclusive. All these mixtures when applied to small samples of from 17 to 37 square feet required an average of 3 quarts to thoroughly treat 25 square feet of bark. This figure is unquestionably higher than would be necessary for larger samples, as a considerable portion was always wasted on the ground. The most effective materials were found to be orthodichlorobenzene, monochloronaphthalene, and naphthalene when used with a fuel oil or kerosene.

Ladybird beetles in hibernation.--According to H. J. Rust, Coeur d'Alene, Idaho, an unusually heavy concentration of the convergent ladybird beetle (*Hippodamia convergens* Guer.) was observed on December 13, 1939, near the head of Nettleton Gulch, on the Coeur d'Alene National Forest. The adults were distributed over an area of approximately 1/4 acre, where under bits of bark and decaying logs they occurred in masses from 2 to 4 inches deep. Without much basis for the estimate, it is believed that there were at least 3 bushels of these insects. This is the largest hibernation of these beetles recorded by this laboratory.

Overcrowding hampers development of mountain pine beetle.--W. D. Bedard, Coeur d'Alene, says that when too many mountain pine beetles attack within a limited area of bark surface, the resultant overcrowing destroys much of the available food material and causes a decrease in the abundance of broods produced. An examination of 295 western white pine trees, containing 58,660 square feet of infested bark, showed the following:

Attacks per square foot	Mountain pine beetle brood per square foot
Number	Number
1 - 4	20.6
5 - 6	25.8
7 - 12	27.4
13 - 14	16.3
15 and 18	9.0
28 and 36	4.7

Thus it is seen that with an increase in number of attacks there is an increase in the abundance of broods produced until the optimum number of attacks is reached. From this point, any increase in the number of attacks results in a decrease in the abundance of brood.

Recoveries of European spruce sawfly parasite.--P. B. Dowden, New Haven, Conn., reports that during the last 4 years a very extensive program of propagating and liberating *Microplectron fuscipennis* Zett. has been conducted in Maine, New Hampshire, Vermont, and New York. More than 140 million of these gregarious cocoon parasites have been liberated in

Maine and more than 23 million in the other 3 States. Practically all of this work has been done by the States involved. The Bureau's forest-insects laboratory at New Haven, Conn., has cooperated by liberating many of the colonies in 1937 and 1938 and by supplying facilities for rearing much of the material liberated in New Hampshire, Vermont, and New York. No detailed program for the recovery of Microplectron has been attempted by the New Haven laboratory, but cocoon collections have been made from time to time which indicate that the species is widely established. The following list indicates the number of towns where this parasite has been recovered and for which the New Haven laboratory has records.

State	Towns Number
Maine	8
New Hampshire	6
Vermont	3
New York	7
Massachusetts	1
Connecticut	1

Practically all of the recovery collections have been small lots of cocoons, which indicate no more than the establishment of the parasite.

Any evaluation of the parasite's effectiveness at this time would be premature, but one permanent study plot at Dublin, N. H., has shown interesting data. This plot comprises 4 acres of pure red spruce, averaging 9 inches in diameter. The ground cover seems very favorable to Microplectron in that it is largely composed of dead needles and duff. Three colonies totaling 30,000 Microplectron were liberated within a few hundred yards of this plot in 1938 and several hundred thousand were liberated in other parts of the town. Ninety-nine square-foot samples of duff were taken in the plot in the fall of 1939. Analysis showed that these samples had 1,110 cocoons containing living sawfly prepupae and 132 cocoons containing living Microplectron. In addition, there were 42 cocoons which previously had produced Microplectron adults. Fifty parasitized cocoons were dissected and they contained an average of 40 parasites per cocoon.

Low temperatures in fall cause high mortality of gypsy moth eggs.--According to H. A. Bess, New Haven, during the winter of 1938-39, field studies were made on the influence of low winter temperatures on the mortality of gypsy moth eggs. The egg clusters used in these studies were collected in Bartlett, N. H., about October 1, and approximately 30 egg clusters were mounted on each of 12 boards. Six of the boards were hung in a weather instrument shelter located at Bartlett and the other 6 in a smaller shelter at Gale River, N. H. One board was removed from each shelter on the last day of each month from November through April. On removal, the egg clusters were isolated in small boxes, placed in a heated room, and later examined to determine the number of larvae that hatched from the different lots. The average hatch per cluster for the different lots and the minimum temperature for each month are given in the table below.

Month	Bartlett		Gale River	
	Minimum temperature	Average hatch per cluster	Minimum temperature	Average hatch per cluster
	°F.	Number	°F.	Number
November----	-10.0	[1] 310 ± 24.4	-20.0	0
December----	-11.5	262 ± 25.2	-11.0	0
January-----	-20.0	2 ± 1.1	-28.0	0
February----	-12.0	3 ± 1.2	-15.0	0
March-------	--	7 ± 2.2	-18.0	0
April-------	--	7 ± 2.3	0	0

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[1] Standard errors are used in preference to probable errors.

A temperature of -20° F. in November was sufficient to kill all of the eggs, whereas a few survived at this temperature in January. This indicates a conditioning of the eggs to cold and that eggs can withstand lower temperatures in January than in November. It is significant that there was no increase in mortality after the last of January. This study was made possible through the cooperation of the staff of the Experimental Forests of the Northeastern Forest Experiment Station located at Bartlett and Gale River.

C. C. C. aids in collecting European spruce sawfly cocoons.--Frank E. Miller, Jr., a collaborator at New Haven, reports that in order to obtain the 5 million cocoons desired for parasite rearing by the New England States and New York, C. C. C. enrollees were engaged for collection work in the Wilmington, Vt., and the Jaffrey, N. H., areas for a period of 5 weeks--from October 1 to November 6. In order to obtain the cocoons, 900 bushels of moss and ground litter (nearly 23 tons) were handled. It was necessary to screen this material twice and then pass it through a winnowing machine before the cocoons were satisfactorily cleaned. The cocoons collected were distributed as follows: Maine, 3,380,000; Vermont and New York, 850,000; New Hampshire, 500,000. While most of these cocoons will be used for the rearing of Microplectron fuscipennis Zett., it is hoped that other parasite species may also be propagated.

Increased pine beetle activity on recent cut-over areas during 1939.--J. W. Bongberg, Berkeley, Calif., states that a considerable increase of pine-beetle activity was observed in 1939 in the reserve stand on areas recently cut over by the Fruit Growers' Supply Company in the eastern Lassen area, Lassen National Forest, Calif. This infestation was made up of top-killing engraver beetles (Ips oregoni Eichh.) and broods of the western pine beetle (Dendroctonus brevicomis Lec.). Large patches of reproduction and many vigorous trees in the reserve stand were killed. The engraver beetles were responsible for the initial attacks in the reserve trees and the death of the reproduction. The western pine beetle readily attacked the remaining green bole of the previously top-killed trees. As many as 23 trees were found in a single group, within an area of approximately 2 acres, and numerous other smaller groups were scattered over the cut-over area.

Mountain pine beetle in Big Tree Grove controlled.--G. R. Struble, Berkeley, reports that considerable damage to mature sugar pines within the Grove area in Yosemite National Park in 1939 resulted from aggressive attacks by Dendroctonus monticolae Hopk. An insect survey made in September revealed that 108 trees, having a volume of 437,630 board feet, were killed since October 1938. Control work by National Park Service C. C. C. crews, begun early in October 1939, had treated all the infested trees within the area by the middle of November. All infested trees were treated by felling and burning the infested bark.

Serious Cylindrocopturus damage in pine plantations.--R. C. Hall, Berkeley, says that very serious damage caused by the weevil Cylindrocopturus longulus Lec. has been observed during the 1939 season in a Jeffrey and ponderosa pine planting in the Big Springs Brush Field of the Lassen National Forest. There appears to be a definite relationship between size of stock and injury, with the small, recently planted material suffering little, but the injury progressing with age and size of stock where very serious damage occurs in the oldest and largest stock, which is about 5 years of age. In these older plantings the mortality due to this insect often approaches 100 percent. One sample count of 147 original trees showed only 7 living in the fall of 1939. A general reconnaissance has shown this insect to be quite generally distributed in natural seedlings throughout the Hat Creek Basin. Control of this insect in the Big Springs Planting by pulling and burning infested stock is contemplated for next spring.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Diverse conditions affect gypsy moth work in various States.--The month started with two snowstorms, accompanied by high winds sweeping across the northern half of Vermont. The snow drifted to a depth of 4 feet or more, effectively closing many of the back roads to automobile travel. The blocking of the roads forced the suspension of gypsy moth work in some sections. Snow, sleet, and rainstorms during the second and third weeks left the highways extremely icy, the heavy rains caused the snow to melt and settle, and foot travel improved materially during this time. Clearing weather during the latter part of the month provided exceptionally favorable scouting conditions. In Massachusetts and Connecticut similar conditions, in general, were present, with icy roads hampering transportation and stormy days hindering scouting operations at times. The crews were detailed to ground work, where they creosoted egg clusters, chopped down dead and worthless trees, and assembled and piled deadwood in preparation for burning. Several of the days that were unsuitable for scouting were ideal for burning great quantities of brush and other waste wood. During the last week in December it became possible to inspect tree growth in swampy areas in both States and to begin thinning work in areas that bordered infested locations. This work had been necessarily delayed until the surface had frozen sufficiently to sustain the weight of the men. In Pennsylvania an ice storm in the Pocono Mountains in the eastern part of the State the first week in December made traveling hazardous and temporarily hampered scouting work in that section. The stormy weather prevalent over the Eastern States during the second week did not interfere with gypsy moth work in Pennsylvania as greatly as in the other States, as the crews had been withdrawn from the woodland areas during the hunting season, from December 1 to 15, and were working in more accessible sections. Absence of snow during the latter part of the month in the areas where gypsy moth work is conducted permitted the continuance of ground work at infested sites. Workers from the State Department of Public Assistance performed some of this work in selected areas in Pittston Township, Luzerne County, while all work of this nature at outlying infestations was done by W. P. A. employees. Scouting conditions were also good, and National Youth Administration crews performed intensive scouting work in a series of towns bordering the Lackawanna River on the east, with W. P. A. crews also working in these towns and in the remainder of the quarantined area.

Few gypsy moth fences dismantled up to December 1.--As a result of the mild weather and absence of snow during November, very few farmers had taken their cattle from the pastures at the end of the month. Consequently, it was necessary to delay the dismantling of the temporary fences erected last spring to prevent the cattle from feeding in areas that had been sprayed with lead arsenate until the winter storms began. Some of the fences strung with considerable difficulty across extremely rugged, ledgy and rocky land may be left undisturbed until it is definitely determined whether gypsy moth infestations still persist to an extent sufficient to warrant respraying next June, provided this can be done with the approval of the property owners.

Old motor oil used to kindle fires quickly.--Salvaged burlap strips saturated in old crankcase oil has proved to be a very satisfactory method of firing brush piles quickly. As burning is done only during rainy weather or when snow is on the ground, the brush piles are often wet and do not readily ignite by ordinary methods. The oil-soaked burlap burns hotly, dries up the brush, and starts it burning in a very short time. Supplies of used motor oil accumulated over a period of about 8 months at the gypsy moth storehouses in Wilkes-Barre, Pa., and Greenfield, Mass., have been drawn upon heavily during December, when conditions were especially favorable for burning work.

Heavy coatings of ice cause misshapen trees.--Gypsy moth scouting crews working in Berkshire County, Mass., found many stands of sapling growth so bent over that it was necessary to discontinue work temporarily in such stands until the ice had melted sufficiently for the trees to straighten up somewhat. It often happens that trees that have been badly bent under heavy weights of snow and ice never straighten up again. This is particularly true of gray birches. It is difficult to conduct some gypsy moth control measures, notably spraying and scouting, in such areas, until the worst tangles of growth have been removed by thinning.

First-aid treatment reviewed by crew leaders.--While serious accidents seldom occur in gypsy moth work, minor injuries such as sprained ankles, cuts, and scratches are sometimes suffered by the men. Practical demonstrations of approved first-aid methods are given periodically in order to keep them fresh in the minds of the crew leaders. Such a demonstration was given on November 23, when a complete review of first-aid instructions was given to an assembled group of supervisors and agents in Connecticut.

Several small gypsy moth infestations found in Vermont.--A small gypsy moth infestation was discovered in Middlebury, Addison County, Vt., near the site of an assembling cage that attracted male gypsy moths last summer. Although work had not been entirely completed at the time of the last report, it was not expected that the eradication of this infestation would prove difficult. Two infestations were recently located in Granville, also in Addison County, one at an elevation of approximately 2,200 feet and the other at about 1,700 feet. A cursory examination of the areas indicated that favorable food plants were not abundant at either location. It was impossible to accurately determine the size of the infestations at that time, as some 6 inches of snow effectively hid egg clusters that may have been deposited on stumps, stones, and ground litter. Further work at these infestations will be done when ground conditions become favorable. Several additional infestations were found in Vermont during the month, all of which were comparatively small. The scarcity of old egg clusters indicated that these colonies are of recent origin. Practically all of the infested spots so far found in Vermont were discovered during examinations of territory immediately surrounding the sites of assembling cages that attracted male gypsy moths last summer.

Satisfactory progress at heavy infestation in Connecticut.--Appreciable progress was made at the heavy gypsy moth infestation in Southbury, New Haven County, Conn., as additional workers were added to the force of men engaged in creosoting and chopping. A crew of scouts made a careful examination of the wooded area in order to determine the extent of the infestation, so that complete plans for extermination work could be formulated and applied.

Gypsy moth employees locate and mark town line.--Experienced employees of this project were recently detailed to locate and suitably mark a section of the town line between Canaan and North Canaan, in Litchfield County, Conn., which was surveyed in 1858 and where no markers whatever exist today. A reasonably accurate determination of this line seemed advisable in order that town records of gypsy moth work accomplished and infestations located and treated this year and in the future could be properly reported and recorded on the town maps.

Small infestations found in eastern part of Pennsylvania.--A gypsy moth infestation consisting of a single egg cluster was recently discovered in Lehigh Township, Lackawanna County, Pa., while scouts were examining the vicinity of two neighboring assembling cages that attracted male gypsy moths last summer. Although a very careful inspection was made for some distance around the infested spot, no further evidence of the insect was found. An infestation of approximately 30 egg clusters was located in Madison Township, Lackawanna County, in the vicinity of an assembling cage where male moths were recovered, and another gypsy moth colony was discovered in Coolbaugh, Monroe County. All of these towns are in the eastern portion of the Pennsylvania quarantined area, and they all had been previously infested.

Current C. C. C. gypsy moth work east of the barrier zone.--Several holidays during December, the return of some gypsy moth men to fire-hazard-reduction work, and the termination of an enrollment period all contributed to a gradual reduction in the number of C. C. C. enrollees available for gypsy moth work from over 2,000 6-hour man-days per week early in the month to only slightly over 860 6-hour man-days during the final week. The work done consisted of the usual control methods of scouting, creosoting, thinning, and burning brush. Several crews in Connecticut that had previously been employed on thinning work were transferred to scouting, and began an examination of territory between the known heavily infested areas and the barrier zone to determine the amount of westward spread and the degree of infestation. These crews found scattered colonies, but had discovered no heavy pockets of infestation up to the end of December. Several very heavy infestations have been located in the town of Rockingham, Windham County, Vt., where as many as 2,000 gypsy moth egg clusters are present on individual trees, and creosoting egg clusters and thinning favored food plants is being pushed in such locations. Rockingham is in the eastern section of Vermont, bordering the Connecticut River, and is not near the barrier zone; however, it is advisable to reduce such heavy infestations in order to diminish the wind spread of the small caterpillars toward the barrier zone.

C. C. C. gypsy moth report for first half of fiscal year.--During the first half of the fiscal year 1940, 25,210 6-hour man-days were used by the C. C. C. on gypsy moth work, and 40,714 6-hour man-days were taken from the planned gypsy moth program and used on fire-hazard-reduction work. Gypsy moth work was done on 21,963 acres, with thinning and rebrushing work being done on 876 of those acres. This work resulted in the destruction of a total of 312,223 new gypsy moth egg clusters. A total of 980,588 gypsy moth caterpillars and pupae were killed at burlap bands during the caterpillar season, which includes parts of 2 fiscal years.

PLANT DISEASE CONTROL

Pennsylvania farmers aid in barberry eradication.--L. K. Wright, leader in charge of barberry eradication in Pennsylvania, reports the results of local control operations in Bradford County as follows: "In the spring of 1939 Henry P. Antoine, agent, visited all farm operators in the Columbia Cross Roads area of Bradford County, outlining plans for a resurvey to destroy seedling bushes that had developed since the initial survey was completed in 1937 and 1938. Farmers in this area had experienced a marked improvement in the yield and quality of their small grains as a result of eradication work done with security-wage labor and they all expressed a willingness to cooperate in any way possible in reducing the cost of necessary follow-up work. Arrangements were made to furnish chemicals necessary to complete resurvey on each farm. In each barn or storage shed a form was posted on which was indicated the amount of salt available at that point, and provision was made for the farmers to record (1) the amount of time they gave to reinspection work, (2) the number of bushes destroyed, (3) the amount of chemical used, and (4) whether or not fruiting bushes were found. Salt was furnished for eradication work on 39 properties, and 31 of the property owners, either alone or with the help of their neighbors, completed a planned inspection of their properties. During the season 910 pounds of salt was used and 1,046 barberry bushes were destroyed. Property owners contributed approximately 4,400 man-hours of time in completing this project. This same group of farmers worked with eradication crews when the initial survey was made, thus gaining first-hand information relative to control procedure. The extent to which they are participating in the program will greatly reduce the cost of subsequent surveys that will be made to insure complete eradication on these farms and adjoining timbered properties."

Crop outlook in Missouri affected by drought.--In view of the location of grain-growing areas in Missouri with respect to those in States farther north, George M. Frandsen, leader in charge of stem rust control work in that State, has found the following information relating to the 1940 winter wheat crop outlook of particular interest. The condition of winter wheat in Missouri was reported at 68 percent of normal on December 1. This was 4 points lower than on December 1, 1938, and 16 points below the 10-year average. This condition is due to dry weather that has prevailed over the State since the latter part of August. The most unfavorable conditions were reported in the northern half of the State. The winter wheat outlook in the northwestern district is 61 percent of normal, the north-central district 62 percent, the northeastern district 67 percent, the west-central district 64 percent, and the central district 69 percent. The estimated acreage of winter wheat seeded last fall is 1,750,000. This is 7 percent below the acreage seeded in the fall of 1938 and about 11 percent below the 10-year average, 1928-37. The reduction in acreage is due largely to dry weather at seeding time and difficulties encountered in preparation of the seed bed. The figures contained in this report were furnished by the Federal agricultural statistician at Columbia, Mo.

Eighty-two-year-old survey maps reproduced.--For the purpose of developing accurate topographical maps of blister rust control areas in Oregon, it was necessary to use 52 township plats of the General Land Office. As the time allowed for use of these maps was limited, the blister rust control photographic laboratory in Spokane, Wash., was called upon to make two scale reproductions of each. With the oldest plats dated 1857, these records covered a period up to 1918, or 61 years. To complicate the problem many of the sheets were soiled, smeared, creased, and wrinkled and not a few, including all photostatic copies, had faded lines. By the process of camera copying of each plat on a 5 inch by 7 inch negative and enlargement back to the scale of 2 inches to the mile on a special insurance bromide paper used for maps, photographer H. Miller Cowling was able to produce clear and sharp reproductions. Commenting on the results, Oregon Supervisor Lyle N. Anderson stated that in all cases our copies were every bit as good as the originals and many of them seemed to be more sharply outlined and far more distinct.

Spread of white pine blister rust in 1939, summary.--During the calendar year 1939 blister rust was found for the first time on either white pine or Ribes in 40 counties, 9 of which are in the Southern Appalachian States and 31 in the North Central region. In the Southern Appalachian region this represents an extension of the disease to the southward on Ribes of 1 county in Delaware and 2 counties in Maryland. In 67 percent of the counties in the North Central region where Ribes infection was found, the infected host plant was Ribes nigrum, indicating the importance of this species in the distribution of the disease. The rust is more or less generally distributed throughout the Northeastern States on both host plants and no scouting is carried on to locate newly infected areas. Observations show that the disease continues to spread unchecked from Ribes to pines in nonprotected areas and that effective control has been accomplished in protected areas. In the Western white pine region of eastern Washington, northern Idaho, and western Montana, there was no extension of the disease reported over that known at the end of the calendar year 1938. Additional infection on Ribes was observed this year in Glacier National Park and the disease continues to spread rapidly and destructively in such young western white pine stands of northern Idaho as have not been reached in Ribes-eradication work. In the Sugar Pine region, the extended hot and dry weather and the lack of favorable winds during the period of canker sporulation appear to have checked the spread of the rust, except in the immediate vicinity of pine-infection centers, and even here infection on Ribes was relatively light, considering their high susceptibility and the volume of aeciospores produced. This is not unusual, as years in which conditions were unfavorable for rust spread have occurred in the past in other parts of the country. The results of scouting in California during the season were negative with respect to the discovery of new locations of infection on Ribes. One sugar pine was discovered along Girder Creek on the Klamath National Forest with 4 incipient cankers of 1937 origin. This infection increases the number of places where pines have been found infected in California to 3 and extends the known range of pine infection in the State to some 14 miles south of the Oregon border.

Forestry meetings held in New Hampshire.--At a series of 17 forestry meetings scheduled to be held in January in various sections of New Hampshire, the program will include white pine blister rust control, woodland management, timber-slash disposal, and forest-fire problems. A discussion of these subjects will be led by State and Federal representatives, including the district leaders in blister rust control. Mr. Newman, in charge of blister rust control work in the State, will operate the motion-picture projector at these meetings, showing pictures appropriate to the topics under discussion. The Bureau of Entomology and Plant Quarantine is cooperating with other Federal and State agencies in arranging for these meetings.

COTTON INSECT INVESTIGATIONS

Cotton resistance to thrips.--L. W. Dunnam and J. C. Clark, Stoneville, Miss., have been giving further attention to factors that influence the intensity of thrips populations in cotton and the destruction of the terminal buds. Sixteen commercial varieties and 252 pure-line selections of 12 varieties of upland cotton were examined this spring to determine whether there was any varietal resistance to thrips. Of the 16 commercial varieties studied, 8 were pilose with an average of 60 percent more hairs per square millimeter of leaf surface than the other 8 glabrous varieties. These varieties were planted early and growth was much slower than in the line selections planted later. Over 36,000 plants of the pilose and glabrous varieties were examined. The 8 pilose varieties were found to have an average of 63 percent fewer thrips per bud than the glabrous varieties but, notwithstanding this significant reduction in population, there was only 1.8 percent reduction in the number of terminal buds destroyed, which was not considered significant. Pilosity of cotton plants thus appears to be of doubtful benefit in reducing the number of terminal buds destroyed; however, the phenomena of a plant furnishing unfavorable shelter for an insect and yet suffering more damage per insect is worthy of note. The pure-line selections of 12 varieties were planted on June 2 in a field located within 200 feet of oats. When the oats were harvested the thrips no doubt migrated to the cotton. About that time the hairy vetch growing along the fence rows was also dying down. This late-planted cotton was very thrifty in the early stages of growth and was kept free of weeds which aided in holding down the thrips damage. All of the 6,784 plants examined showed severe leaf ragging and from 0.7 to 4.7 percent, averaging 2.5 percent, of the terminal buds were destroyed. In the early planted commercial varieties, where the growth was slower, as high as 39 percent of the terminal buds were destroyed, although the leaf ragging was no more severe than in the late-planted selections. Apparently one of the greatest factors determining resistance or tolerance to thrips damage to buds of cotton is the thriftiness of the plants early in the season. Other factors being equal, some varieties appear to develop stronger plants under adverse early spring weather conditions and thus tolerate greater thrips populations with no more damage to terminal buds than other varieties with less thrifty plants and lighter thrips populations.

The pH relationship of cotton-leaf-cell sap to aphids and calcium arsenate.--E. W. Dunnam and J. C. Clark, Stoneville, have been giving this subject special attention. The symbol pH, suggested by Sorensen, denotes the negative logarithm of the concentration of the hydrogen ion in gram atoms per liter. A solution having a pH value of 6 is a very weak acid but has 10 times the concentration of hydrogen ions present as in pure water which has a pH of 7. Thus, a slight change in the scale means a great change in the small units of measure. Therefore, diminishing numbers in the pH scale denotes an increase in acidity. The test was conducted under field conditions with 3 varieties of upland cotton. Two of the varieties were the same as those grown during the last 2 seasons for studies of calcium arsenate and aphid relationships. In one part of the test 4 plots were duplicated. Each plot consisted of 12 rows 121 feet long. Two varieties were grown in each plot. One plot of each variety was left undusted and the others received 3, 6, and 9 applications of calcium arsenate dust, respectively. The rate of dust application was 10 pounds per acre at approximately 5-day intervals. The first application to each variety was made July 5. The dusting schedule was completed August 15. In the second part of the test 2 6-row plots 121 feet long of 1 variety were used and 3 applications of calcium arsenate were applied to 1 plot on July 12, 17, and 24. Three times during the season 1 2½-inch disk was cut from the fourth leaf from the top, or top-zone leaves, by means of a leaf sample cutter from each of 100 plants on the 2 middle rows of each 6-row block. The total area of each 100 disk samples was 490.9 square inches. By use of a binocular counts were made of all aphids on both surfaces of leaves. After the aphids were counted the sap was pressed out by use of standard 2¼-inch-cylinder equipment and a hydraulic press with a capacity of 2,500 pounds per square inch. It was not difficult to extract from 2 to 5 ml. of cell sap from a sample, which was sufficient to take an accurate reading with a standard pH meter. As soon as all data were obtained for the sample taken near the top of plants, more mature infested, middle-zone leaves were collected and the cell sap extracted for investigation. Under the conditions of the experiment, the pH readings of sap extracted from leaves collected from undusted plants were analyzed statistically by the methods used by Snedecor, and it was found that significant differences in pH existed between Ambassador and Delfos 6, or Deltapine A and Delfos 6, regardless of the zone from which leaves were collected. The pH differences between Ambassador and Deltapine A were not significant for undusted plants collected from either zone. There was significant correlation, however, between the pH of sap expressed from both top- and the middle-zone leaves and the number of aphids per square inch of the top-zone leaves regardless of variety. The average pH of sap expressed from the top-zone leaves of the controls was higher than that for the same varieties receiving 3 applications of calcium arsenate. Apparently this lowering of pH resulted from a temporary stimulation of plant growth, or succulence, which is in agreement with plant-height records. Where as many as 6 or 9 applications of dust were applied the pH was higher for the top-zone leaves than that of corresponding controls. The pH of middle-zone leaves of each variety was higher than that of corresponding top-zone leaves. Where there was a combination of increased pH and aphid populations, a forced plant maturity occurred. Thus, there was a significant relationship between the pH readings and the number of applications of calcium arsenate. Also there was a significant positive correlation between pH readings and aphid populations following the various treatments. There were slight fluctuations found in the pH of cell sap throughout the tests, but there were definite trends for the aphid population to increase with rising pH values. On undusted plants the pH increased as the season advanced, but not as rapidly as that of dusted plants. Although there was a direct correlation between rising pH of the sap and aphid populations, some pH records among some miscellaneous tests were high with comparatively few aphids present. This would offer evidence that the reduction of sap by heavy aphid populations was not the principal reason for the increased readings. But in every case where the population was high the pH reading was high. Thus, this investigation does not explain the cause of the increased aphid populations following calcium arsenate dusting, but it does add to our knowledge concerning the reaction of the cotton plant to the insecticide and the type of medium satisfactory for rapid reproduction. Apparently the most plausible explanation of these interesting relationships would be that calcium arsenate hastens the maturity of cotton plants. The pH of cell sap rises as cotton plants mature. The biology of the aphid is apparently influenced by its host plant.

Host-plant studies of pink bollworm.--As part of the research program conducted in cooperation with the Division of Pink Bollworm and Thurberia Weevil Control, L. C. Fife, F. F. Bibby, W. D. Higdon, and J. B. Wootten have been examining the buds, flowers, and seed capsules of cultivated and wild malvaceous plants in the vicinity of Matamoros, Mexico, and Brownsville, Tex. With the light pink bollworm population in that area, cotton and okra appeared to be the only host plants of importance during the fall of 1939. Pink bollworms have not been found in any other host plants since September 15 when, as previously reported, one pink bollworm was found in a seed capsule of Turk's cap (*Malvaviscus drummondii*). The other malvaceous plants that have been examined during the fall of 1939 with negative results so far as the pink bollworm is concerned are: *Abutilon berlandieri*, *A. hypoleucum*, *A. incanum*, *A. indicum*, *A. jacquini*, *A. pedunculare*, *A. trisulcatum*; *Althaea rosea*; *Anoda pentaschista*; *Hibiscus mutabilis*,

H. cardiophyllus, H. syriacus; Malachra capitata; Malvastrum americanum, M. spicatum; Malvaviscus arboreus, M. drummondii; Sida angustifolia, S. cordifolia, S. hastata; Wissadula amplissima, and W. holosericea.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Field clean-up in the Big Bend.--The first step in the control program for the Big Bend area of Texas for the 1940 crop season was inaugurated during the last few days of October, when cotton-stalk destruction was begun in the Presidio area. This program was initiated following the determination by State and Federal agricultural officials that such a course was expedient in order to maintain the great reduction in pink bollworm infestation effected through the control measures applied under the "2-year plan," which was terminated with the maturity of the 1939 cotton crop. Owing to the unusual amount of rain in that area during November, the clean-up was not completed until about the middle of December; however, the most heavily infested fields were cleaned early in November before the interference of rain. The next step in this program is delayed planting of the 1940 crop, and the maintenance of a host-free period, through the elimination of all stub and sprout cotton as it develops, until most of the pink bollworm moths emerging in the spring have perished because of the absence of a host on which to perpetuate themselves. Similar control measures for suppression of the pink bollworm are again being employed in the Big Bend area on the Mexican side of the Rio Grande, in the Ojinaga region. Cotton in that area was a little later than on the American side, necessarily retarding the cleaning of fields. Consequently, the greater part of the clean-up in that area was done in December.

Destruction of soca cotton and random plants in south Texas.--Following the completion of the stalk-destruction program in cottonfields planted in 1939, contacts with growers were intensified to encourage the destruction of seedling and sprout plants, which developed after fields had been accepted as being in compliance. Most farmers gave good cooperation in this respect, many recleaning their fields for the third or fourth time. During the early part of December, however, this being the busy season in the lower Rio Grande Valley area for the preparation of land for vegetable crops, growers began neglecting their cottonfields, and expressed the feeling that continued stalk-destruction work constituted a considerable hardship. A systematic check was therefore begun of all fields planted in 1939, as well as soca and abandoned acreage, and it was found necessary to rework all fields with Bureau labor in order to destroy cotton that might become a menace prior to the maturity of the 1940 cotton crop. Good progress was made in this work during December, and it is felt that the thoroughness with which this operation is being accomplished, on account of Bureau funds available for this work, should show favorable results in the degree of infestation in the 1940 cotton crop.

Plans for the 1940-crop season in south Texas.--A meeting for the purpose of determining the future course to be pursued in efforts to control and eradicate the pink bollworm from south Texas areas was called by Lee A. Strong on December 15, at San Antonio, Tex. This meeting was attended by Federal and State agricultural officials from practically all of the cotton-growing States, as well as by many cotton growers, processors and other interested persons from south Texas regulated areas. The assembly was unanimous in expressing the desire for the continuation and intensification of assistance of Federal and State agencies as applied during the last year. Following the meeting, resolutions were passed to the effect that every effort would be made by south Texas delegates to obtain an adequate appropriation from Congress to continue and intensify the fight against the pink bollworm in that area for the coming year. In response to the expressed desire of growers in that area to institute a more intensive program for the 1940 crop season, the State Department of Agriculture issued an order on December 26, establishing the planting period for cotton in the lower Rio Grande Valley counties between the dates of February 20 and April 1, thus shortening the growing period for cotton and creating a more favorable host-free period. Also, as an added precaution against the possible spread of the pink bollworm from the lower valley area during the coming season, a proclamation was issued by the State commissioner the latter part of December providing for the sterilization of cottonseed as a continuous process of ginning in the counties of Cameron, Hidalgo, Willacy, and Starr, referred to as the lower valley counties. At a meeting of farmers in the Matamoros area of Mexico during the latter part of December, the assembly was unanimous in requesting that the planting period be fixed between February 20 and March 20 for the heavily infested area of the lower Rio Grande Valley of Mexico.

Gin-trash inspection.--Inspection of gin trash is carried on each year throughout the harvesting season in the various areas at the most effective periods for determining the degree of pink bollworm infestation in known infested areas, as well as for locating incipient infestations outside regulated areas. Gin-trash inspection for the 1939 crop season was brought to a close around the middle of December with the completion of operations in Arizona. A comparatively heavy pink bollworm infestation was found to be present in the Glendale area of Maricopa County. No infestation was determined in that section last year, and no suppressive measures were applied. Infestation was determined to be considerably lighter in all other known infested areas in the Arizona district. At the close of December plans were being made to begin clean-up operations on approximately 3,000 acres of cotton land in the Glendale section of Arizona early in January.

Thurberia-plant eradication.--The Thurberia-plant-eradication program, as designed and initiated in 1935, was for the purpose of removing Thurberia plants from the western slopes of the Santa Catalina Mountains and from the entire range of the Tortillitas in Arizona. Thurberia plants existing in these mountains are infested with a weevil which attacks cultivated cotton and, consequently, constitute a dangerous threat to domestic cotton plantings throughout the Santa Cruz Valley. The removal of plants from these ranges is now fast drawing to completion. The Tortillitas have been gone over twice, and on the second coverage very few plants were found, as compared to the original number removed. It is now planned to reenter the western slopes of the Catalinas late in January for the purpose of rechecking that mountain range.

Wild-cotton eradication in Florida.--The pink bollworm was discovered in domestic cotton plantings in northern Florida in 1932, having spread there from wild cotton in southern Florida. Consequently, during that same year, an effort was begun to eliminate wild cotton from a very considerable area along the west coast of Florida and numerous keys along the southeast coast. During December, 12 W. P. A. crews and 2 Bureau crews were engaged in wild-cotton-eradication activities. At the close of the first week in December approximately 200 C. C. C. enrollees were received at the camp at Cape Sable, established by the Army and Forest Service for the purpose of aiding in wild-cotton eradication in that area. Approximately 90 of the total number of enrollees were available for actual plant-destruction work, and this activity was begun on December 11. Others were assigned to road work and camp maintenance. Owing to the C. C. C. men being entirely unfamiliar with this type of work, and also to disruption caused by the holiday season, considerable trouble was experienced during the first few weeks in efforts to bring the eradication work up to a higher standard of efficiency. Toward the close of the month there was discernible improvement in the performance of the work, and a greater amount of acreage per man-day was being cleaned. The number of wild cotton plants being found in the Cape Sable area this season is considerably less than in the same sections last season, the ratio being approximately 100 to the acre last year as compared to about 80 per acre this season. In all other south Florida areas where wild cotton is being eradicated, very few mature plants are being found, and a comparatively small number of seedlings is being found in most areas.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Cauliflower, dusted before flower-forming, escapes excessive residues.--C. E. Smith and R. W. Brubaker, of the Baton Rouge, La., laboratory, report that the marketed portion of crops of cauliflower dusted at approximately 10-day intervals up to the time when flowering began, using a dust mixture composed of 19 parts of calcium arsenate and 1 part of paris green, by weight, directed against several species of common cabbage caterpillars, did not bear a residue equaling the legal tolerance of 0.01 gram of AS_2O_3 per pound. The last application of the arsenical mixture was made on November 15 and samples for analysis were harvested on December 6 and 13. Over 2 inches of rainfall occurred between the last dusting and harvesting, a period of approximately 3 or 4 weeks. During the flower-forming and harvesting period, the crops were protected with applications of a dust mixture containing 1 percent of rotenone. The principal species of cabbage caterpillars attacking the cauliflower in these tests were the cabbage looper, the imported cabbage worm, the diamondback moth, and the cross-striped cabbage worm, as well as several species of Agrotinae. The indicated schedule of arsenical and rotenone-containing dust mixtures protected the cauliflower plants from the above-mentioned species of caterpillars so that the marketability of the crop was not affected adversely.

Survey made to determine status of ships, railroad cars, and auto trucks in dissemination of stored-tobacco insects.--As the result of a survey made by L. W. Brannon, of the Norfolk, Va., laboratory, during the period October to December 1939, to determine the role of ships, railroad cars, and auto trucks in disseminating stored-tobacco insects, principally the tobacco moth and the cigarette beetle, it was found that none of these insects were present on any of the 70 ships loading export tobacco examined, although in many instances materials such as tapioca flour, cacao beans, copra, pepper, peanuts, dried figs, raisins, and currants, which might serve a diluent caused foliage injury. Results with and without hoods were not sufficiently consistent to enable the determination as to whether the use of these mechanical aids to the application of dust mixtures on beans is warranted.

Potatoes following alfalfa in different crop-rotation series show least damage to tubers.--In checking the results obtained in different crop-rotation series at Prosser, Wash., K. E. Gibson, of the Walla Walla, Wash., laboratory, found that the least damage to potato tubers from wireworms, principally the sugar beet wireworm (Limonius californicus Mann.) and L. canus Lec., the Pacific coast wireworm, occurred in plots which followed alfalfa of previous years, and that these plots also contained, on an average, the lowest wireworm populations. Furthermore, the finest grade of potatoes were harvested from the plots that followed alfalfa, irrespective of wireworm damage in those plots. The highest degree of damage to the 1939 crop of potatoes in these plots occurred in the rotations where potatoes followed wheat or potatoes of the preceding year. In classifying the rotation series into six groups, on the basis of the crops that preceded the 1940 potato crop, the following data were obtained:

Potatoes following	Average wireworm population per square foot	Average total damage
	Number	Percent
Alfalfa	1.4	18.66
Sweetclover	1.6	52.24
Sugar beets	3.6	60.51
Corn	4.8	57.54
Potatoes	5.2	69.15
Wheat	7.6	63.69

INSECTS AFFECTING MAN AND ANIMALS

Field tests on natural screwworm cases.--Henry E. Parish and Edward F. Knipling, of the Menard, Tex., laboratory, report: "Field tests were conducted on nine selected ranches in Menard and Kimble Counties, Tex., during 1938 and 1939. Results of tests with pine-tar oil, diphenylamine, p-nitrophenetole, diphenylene oxide, and a mixture, diphenylamine 95 percent and calcium stearate 5 percent, are presented. Tests in 1938 with pine-tar oil and diphenylamine showed diphenylamine to be several times more effective as a wound protector than was pine-tar oil. Tests in 1939 showed diphenylamine to be the most effective wound protector tested. Owing to cost, p-nitrophenetole, although slightly more effective than diphenylene oxide, was eliminated. Although slightly less effective than diphenylamine, this material may be a practical treatment in screwworm control, because of its low cost and because of its advantage over diphenylamine in that it does not cake upon exposure to high temperatures. The addition of calcium stearate to diphenylamine for the purpose of preventing caking decreases the effectiveness of diphenylamine as a wound protector."

Gulf coast tick control; laboratory tickicide tests.--A. L. Brody, of the Panama City, Fla., laboratory, reports the following: "A simple method of testing the toxicity of chemicals to the Gulf coast tick was devised.

than phenothiazine, while 3 others were at least of about equal toxicity. Seven cadmium compounds were tested and proved to be low in larvicidal value. None gave complete mortality at 100 p. p. m. Mixtures of 2 organic compounds in equal proportions were tested but the results gave no indication of synergistic action between any of the 8 materials included in various combinations in the series. On the other hand there was some indication that diphenylamine caused a reduction in the effectiveness of the compounds with which it was mixed. The use of penetrol with 5 organic compounds failed to increase their effectiveness. In most cases the larval mortality was actually reduced, which is in marked contrast to the effect of this oil on phenothiazine. The mortality produced by several organic compounds was higher when the solutions were diluted in distilled water than when tap water was used. These results may have been related to the difference in pH values of the 2 waters. Phenothiazine was found to act as a contact poison on *Culex* pupae, particularly in solutions containing penetrol. Acetone solutions of 4-(p-bromophenylazo)-m-cresol had little effect on the pupae."

Water condition and plant associations in relation to mosquito breeding.--G. H. Bradley and B. V. Travis, of the New Smyrna, Fla., laboratory, have presented a summary of the field studies made in Volusia County during the last season on a series of salt-marsh stations where weekly records were made as to water conditions and mosquito breeding. Special attention was given to methods for determining the relative and total seasonal production of salt marshes as a statistical basis for comparing the importance of different areas. Larval abundance on these stations was found to be highly correlated with the presence of the salt-marsh grass *Distichlis spicata*. On 1 station representing this type of plant growth, 10 larval broods were recorded out of 20 weekly observations made during the season, and the total seasonal production for this marsh was estimated at about 46 million larvae per acre. The next heaviest production occurred on a marsh overgrown with spike grass (*Juncus roemerianus*), which produced 8 broods for an average of 30 million larvae per acre. The lowest production occurred on a station where the 2 species of bunch grass (*Spartina bakeri* and *Fimbrystalis castaneae*) were dominant, the average production here being less than 1 million per acre. This last type of growth as a rule occurs in low marshes having a low average salinity.

Stimuli for hatching of salt-marsh mosquito eggs.--Messrs. Bradley and Travis also report that water infusions of several species of salt-marsh plants were found to be effective as hatching stimulants for eggs of *Aedes taeniorhynchus* (Wied.) and *A. sollicitans* (Walk.). This was likewise true with solutions containing asparagine and sodium biphosphate in the proportions reported as effective for the flood-water mosquitoes of the Northwest. In the tests described here the hatchings obtained with the asparagine solutions were approximately equal at all concentrations ranging from 0.008 to 0.125 gram of asparagine per liter. Higher concentrations proved to be more or less harmful to the eggs or young larvae.

FOREIGN PLANT QUARANTINES

Important interception at New Orleans.--An examination of a lot of 30 pounds of green string beans originating in Brazil, found in the vegetable chill room of the Japanese M. S. *Yamazato* arriving at New Orleans recently, showed approximately 50-percent damage by the larvae of two species of Lepidoptera. Judging from the number of specimens found, the larvae of *Maruca testulalis* (Gey.) were responsible for two-thirds of the damage, while those of *Epinotia opposita* Hein. caused the remainder. In several pods the larvae of both species were found together and the injury caused by each was identical. The larvae of *Epinotia* were all alive and quite active, while those of *Maruca* were either dead or in a comatose condition, due possibly to the low temperature maintained in the chill room. Apparently this is the first record of the occurrence of *Epinotia opposita* Hein. from Brazil.

Cooperation from passengers at Norfolk.--Two passengers from Panama, disembarking from an American intercoastal steamer at Norfolk, Va., recently, had their baggage placed on the dock for the usual customs inspection in the presence of a plant-quarantine inspector. All baggage was found in proper order except one item resembling a coat hanger, covered with paper folded in the shape of a woman's large purse. Inside the paper cover were found seven orchid plants on a piece of limb about 1 foot long, suspended from either end with wire. The passenger, having no special permit, willingly turned the entire outfit over to the plant-quarantine inspector for inspection and destruction. An interesting phase of the interception which should be mentioned was that the passenger who had the plants was "on the spot," owing to the fact that the other passenger, when questioned about plants or plant products in his baggage, replied in the negative but told the inspector he had better talk to his fellow-passenger about this subject.

Dixie Clipper brings pests into port.--When the Pan American Airways seaplane *Dixie Clipper* arrived at Port Washington, Long Island, N. Y., on November 23, 1939, from Lisbon, Portugal, the Azores, and Bermuda, 2 bouquets from Bermuda were abandoned. One bouquet consisted of 15 chrysanthemum cuttings and the other of three gladiolus cuttings and 30 jasminum cuttings. The following interceptions were made from the chrysanthemum cuttings: *Septoria chrysanthemella* Sacc., *Frankliniella insularis* (Franklin) (adults), *Haplothrips gowdeyi* Franklin (adults), *Orius insidiosus* (Say) (Anthocoridae), *Macrosiphoniella sanborni* (Gill.), *Polia* sp.? (Noctuidae), *Homoeosoma* sp.? (Phycitidae), and a sp. of Geometridae. From the gladiolus cuttings, the following interceptions were taken: *Laphygma frugiperda* (A. & S.) and *Frankliniella insularis*. One of the passengers had some bottles of liquor on which were wheat, rye, and oat straw jackets from Portugal. *Puccinia graminis* was intercepted on the wheat straw.

Inspection notes from San Francisco.--During the inspection of passengers' baggage on the S.S. *Lurline* arriving from the Hawaiian Islands, a single sprig of Island cotton, picked by the owner as a souvenir, was intercepted in a suitcase and on inspection was found to carry four live larvae of the pink bollworm (*Pectinophora gossypiella* Saund.). Three species of injurious snails, viz.: *Cochlicopa lubrica*, *Carychium minimum*, and Polita sp., new to our fauna, were intercepted infesting a single shipment of rhododendron plants from England.

Inspection notes from San Pedro.--While inspecting baggage being removed from a tanker from Hawaii, a member of the crew became panicky and confessed to having 6 papayas in his possession. This violation was taken up with officials of the Oil Company who promised to take suitable steps to correct the situation. While inspecting cargo discharged from the liner Matsonia from Honolulu, a package of jam was found to have a small box of fresh Hawaiian peppers secreted therein, a potential host of the melonfly. A shipment of 20 cases of cipolline (grape hyacinth) bulbs from French Morocco were found to harbor several live snails known as Helix lactea, a closely related species to Helix pisana. The entire lot was hand-picked and 20 snails were removed and destroyed.

Eagles infested.--While inspecting the baggage and personal effects of a passenger who arrived at the port of Seattle from Japan on October 4, 1939, Inspector C. V. Scott found three eagles to be infested with insects. The insects were not Mallophaga but the bostrichid Dinoderus minutus Fabr., for the eagles were of wood, beautifully carved from bamboo. The eagles were bound together with braids of rice-straw rope, which of itself carries a pest risk because of the frequency with which unprocessed rice straw from the Orient is found to be infested with the destructive Asiatic rice borer (Chilo simplex Butler).

Entomological interceptions of interest.--Eight living larvae of the dark fruitfly (Anastrepha serpentina Wied.) were intercepted at New Orleans on September 7, 1939, in a sapote fruit in passenger's quarters from Honduras. A living adult of the mordellid Naucles pusio (Lec.) was taken at El Paso, Tex., on June 27, 1939, on a rose flower in baggage from Mexico. A living specimen of the mirid Orthotylus virens (Fall.) was intercepted at Detroit, Mich., on August 24, 1939, on cut heather in the mail from Scotland. A living larva of the phycitid Moodna bisinuella Hamp. arrived at Eagle Pass, Tex., on August 22, 1939, in an ear of green corn in baggage from Mexico. A living adult of the scarabaeid Genuchinus velutinus Westw. was found at Charleston, S. C., on September 5, 1939, on a banana leaf in cargo from Guatemala. A living larva of the elaterid Brachylacon murinus L. was intercepted at New York on August 3, 1939, in a peony root in baggage from Yugoslavia. A living adult of the cerambycid Drycothaea sallei Thoms. was found at Baltimore on August 14, 1939, with bananas in cargo from Honduras. A living larva of the tenebrionid Alegoria dilatata Cast. arrived at Boston on October 12, 1939, on a banana leaf in cargo from Honduras. Six living larvae of the otitid Eumecosomyia nubila Wd. were taken at Laredo, Tex., on September 15, 1939, in green corn in baggage from Mexico. A living specimen of the lygaeid Heraeus cincticornis Stal was intercepted at Washington, D. C., on October 10, 1939, with wild orchids (Cattleya) in cargo from Venezuela.

Correction.--In the News Letter dated December 1, 1939 (v. 6, No. 12, p. 28, line 4) the note should have stated that "living specimens of Kakothrips robustus (Uz.) were intercepted at New York on July 3 on pea pods in ship's stores from the Netherlands," and not "from Italy."

Pathological interceptions of interest.--Plant-disease determinations received during the month included *Bacterium citri* Doidge on pomelo from Straits Settlements taken at Philadelphia December 21; *Colletotrichum macrosporum* Sacc. on *Cymbidium finlaysonianum* from Philippine Islands at San Francisco on August 21; *Cytospora ambiens* Sacc. on chestnut bark on many hoops in cargo from Italy on November 29 at New York; *Erysiphe polygoni* DC on *Cuminum cyminum* seed from Malta on November 17 at New York; *Fusicladium depressum* (B. & Br.) Sacc. on fennel seed from Italy on September 27 at New York; *Fusicoccum quercinum* Sacc. on oaks from Germany on April 20 at Washington; *Gloeosporium croccatum* Sacc. on *Pedilanthus* sp. from Mexico on July 19 at San Francisco; *G. odontoglossi* var. *macrospora* Verpl. on *Odontoglossum* spp. from Colombia on July 15 at San Francisco; *Gloeosporium* sp. (no species reported on host) on *Caralluma* sp. from Portuguese East Africa on June 20 at San Francisco; *Hendersonia* (*donacis* Sacc.?) on *Arundo donax* canes from Palestine on September 8 at New York; *Ijuhya vitrea* Starb. on *Aglaonema* canes from China on April 14 at San Francisco; *Myxosporium* sp. (no species reported on host) on *Euphorbia* sp. stem from Straits Settlements on May 3 at New York; *Nectria binotiana* Sacc. on *Phalaenopsis* sp. from France on June 1 at Washington; *Phoma* sp. (unlike species known to occur on host) on *Euphorbia* sp. from Portuguese East Africa on June 20 at San Francisco; *Phomopsis prunorum* Grove on *Prunus laurocerasus* stem from France on May 8 at New York; *Phyllosticta nigromaculans* Sacc. on orchid from Mexico on October 30 at Brownsville; *P. stanhopeae* All. on *Stanhopea* sp. from Mexico on September 12 at San Francisco; *Phyllosticta* sp. (possibly *P. dances* but no material available for comparison) on *Ruscus* sp. from Italy on May 11 at New York; *Physalospora rosicola* Sacc. on various rose varieties from Australia on July 17 at San Francisco; *Sclerotinia* spp. on narcissus bulbs from Holland in various shipments during the season at New York; *Septoria caricis montanae* Vestergren on *Carex montana* from Sweden on June 26 at New York; and *Vermicularia* sp. (no species reported on host) on *Caralluma* sp. from Portuguese East Africa on June 20 at San Francisco.

DOMESTIC PLANT QUARANTINES

Crops protected in grasshopper-control program.--For each dollar spent for the purchase and mixing of poison bait in the grasshopper-control program in 1939, $52 was saved in crops protected, according to estimates of State leaders in the control campaign. Nearly 57,000,000 acres of crops, having a value of over $128,000,000, were protected by the Federal-State bait-spreading operations, and 235,000 farmers spread 153,500 tons of bait, dry weight. It is believed that the plan of operation this year of dividing the work according to the two types of problems involved, that of (1) crop hopper infestations of the Western States, and (2) areas infested by species with migratory tendencies in both the northern and the southern parts of the Great Plains, brought about the correction of errors in operations of the previous year. In the southern Great Plains area, baiting on the hatching grounds of the long-winged migratory species and, later in the season, baiting of adults congregating for egg-laying purposes, reduced their numbers to a very low point. In the northern Great Plains area, all details were arranged with the local leader in each township well in advance of the bait-spreading season, so that the program moved along with surprising efficiency. County lines were disregarded and special attention was given to idle and abandoned land and depleted range. This procedure necessitated participation by the Bureau, and included bait materials, labor, spreaders, distribution of bait, and the use of airplanes over areas that could not be reached by other means of baiting. The actual baiting season lasts only about 40 days, and only portions of the day are suitable for spreading bait, therefore, it was surprising to farmers to see just how systematically and efficiently the work in the areas infested with the migratory species could be accomplished. In the crop-hopper areas the county agents were responsible for leadership and they conducted the most successful program this year ever accomplished for crop protection.

More about the results of Mormon cricket control.--It is estimated that nearly 1,250,000 crop acres were protected in the Mormon cricket control operations of last field season, conducted jointly with the States and other cooperators, in 65 counties in Idaho, Montana, Nebraska, Nevada, Oregon, South Dakota, Utah, Washington, and Wyoming. This estimate is based on observations of State and local supervisors, and it is believed to give a fairly representative picture of the existing situation. Damage to cultivated crops by the crickets was held to a minimum in all areas of the region. Although the percentage of injury to all crops in the region showed a higher average than in 1938, the crop losses of slightly over 6,000 acres were half that of the previous year. The destruction of range lands likewise was reduced 50 percent in acreage. Such losses, however, totaled over 960,000 acres in 1939. The most important development in the work of the past season, it is believed, is the further swing away from hand dusting to power dusting, which is mainly responsible for dusting nearly 51,000 acres more than in 1938, at a cost per acre of $1.54, as contrasted with $2.15 per acre in 1938.

Chinch bug survey.--In consideration of the unusually large number of chinch bugs which appeared in the summer and fall of 1939 in certain sections of Ohio, Indiana, Illinois, Missouri, Iowa, Nebraska, Kansas, and Oklahoma, a survey of such infestations was made by the Bureau jointly with the affected States, to determine the possibility of these insects occurring in outbreak numbers in 1940. This work, which was completed in a 5-week period ended about December 15, indicates that, in the absence of unfavorable climatic conditions or other influencing factors during the coming months, outbreaks of chinch bugs may be expected in all the above States. Areas that show indications of infestations of a heavy or severe degree extend from the eastern parts of Nebraska, Kansas, and Oklahoma, through large portions of Iowa, Missouri, and Illinois, a considerable portion of Indiana, and a somewhat lessened area in Ohio. Infestations of a light or threatening type are also recorded throughout the region. State pest-control officials estimate that 10,646,000 gallons of creosote may be needed for the control of these pests in 1940. A total of 4,761 samples was taken in the 8 States. The samples consisted for the most part of big bluestem, little bluestem, and broom sedge. The survey was conducted in 432 counties. In estimating the needs, consideration was also given to the acreage of corn or other cultivated crops in each county.

Some results of peach inspection work.--Inspections for the phony peach and peach mosaic diseases were made in 1939, cooperatively with the States, in 22 States from the Atlantic to the Pacific coast. Over 188,000 properties were inspected. The mosaic disease was found infecting over 64,000 peach trees. The new cases, however, numbered less than 25,000, a reduction of approximately 9,000 since 1938. In the areas regulated under peach mosaic quarantines of the affected States, inspection was made of 264 nurseries and 258 budwood properties, and also of all areas within a 1-mile zone of such nurseries and budwood sources. Twelve percent of the nurseries and 8.5 percent of the budwood sources failed to meet certification requirements. Nurserymen were immediately advised of conditions as to the budwood properties, in order that other selections might be made. Nurserymen strongly endorsed this action as a service toward growing better nursery stock. The inspection of dealers' sales' grounds resulted in finding that 9 of the total of 117 failed to meet certification requirements.

Nursery inspections for phony peach disease.--In the phony peach area all nurseries growing peach stock, a total of 664, were found to fulfill the conditions for shipping interstate. The 716 phony trees found in the environs of these nurseries were removed prior to June 30, in compliance with the standardized provisions of State quarantines. This is the second consecutive year in which all nurseries in the area have met the certification requirements. When it is considered that the 664 nurseries are located in 15 States, and are growing 26,000,000 peach trees, the percentage of trees found to be infected with the phony peach disease within the radius of a mile of the nursery is trivial indeed. The finding of the 716 infected trees necessitated inspection of trees on 27,800 properties.

Survey for larvae of white-fringed beetle.--An intensive survey for larvae of the white-fringed beetle is being made in several infested areas in order to determine the relative effectiveness of control measures. Several 160-acre tracts where infestations are abundant have recently been selected in Mississippi and Alabama for observation. In this work, larvae were found at Maybank, Miss., numbering 57.3 to the square yard in cultivated fields, and 6.3 to the square yard in woodland. In 5 areas a survey of larvae of both species of the beetle gave the following results:

Type of land	Larvae per square yard
	Number
Treated cultivated land	6.2
Untreated cultivated land	50.3
Treated woodland	2.7
Untreated woodland	8.6

Land cleared for control of white-fringed beetles next season.--Making ready for dusting and spraying work when the conditions are right for such operations, relief-labor crews are being employed in clearing infested woodland of brush and debris. During December over 400 acres were cleared at Florala, Monroeville, and Mobile, Ala., and Pensacola, Fla.

Nursery work at New Orleans.--Nurserymen and florists in New Orleans are continuing to install plunging beds and barriers recommended for preventing natural infestation by white-fringed beetles, and to arrange for the sterilization of their soil. Out of 1,916 calls made by State and Federal inspectors at New Orleans in December, 1,023 were for the purpose of checking certified units, checking the receipt of plant shipments, and explaining requirements for maintaining a certified establishment.

The sweetpotato weevil situation.--Active infestations of the sweetpotato weevil have been reduced to 428 in the areas in Alabama, Georgia, Mississippi, and Texas, in which eradication of these pests has been undertaken jointly with the States since July 1937. An infestation is considered active if weevils have been found on the property within a 12-month period. In Georgia active infestations within the eradication area have been reduced from 70 in 1937 to 20 in 1939.

Transit inspection in the Northeastern States at the Christmas shipping season.--In preparation for checking the movement of Christmas greenery from the gypsy moth area, special tours of inspection were drawn up and the 11 full-time transit inspectors in that region were assisted by 8 additional inspectors assigned by the Japanese beetle-gypsy moth quarantine enforcement projects. This assistance made possible a force of 8 inspectors at New York, 4 at Boston, 3 each at Philadelphia and Pittsburgh, and 1 at Springfield, Mass. The tours of these cities were so arranged as to permit of as thorough and coordinated a check as possible of material from the gypsy moth area by mail, express, freight, truck, and boat. In metropolitan New York, the mail and express terminals were covered 24 hours daily. Freight stations and piers were checked at opportune times. Carlot shipments of Christmas trees were examined at the New York, Philadelphia, and Pittsburgh terminals, and 585 cars were checked. Of the cars arriving in New York City, 92 percent were of Canadian origin and 8 percent were from New England. At Pittsburgh, however, shipments of New England Christmas trees constituted 72 percent of the arrivals. All carlots of trees examined from the gypsy moth area were properly certified. Although the large number of shipments of the home type, which had been certified at origin in conformity with quarantine regulations, attracted the attention of inspectors at all stations, the infringements of quarantines found in the Northeastern region in December totaled 483. These were consigned to 39 States, the District of Columbia, the Canal Zone, Puerto Rico, and Canada. About 91 percent of these infringements involved the gypsy moth quarantine. Most of the materials were of the type that could be inspected in transit and certified by the transit inspector.

Interceptions of interest.--At Boston 2 well-concealed shipments of evergreen cuttings were found in crated furniture, 1 air-express interception was made, and 40 shipments of boxwood corsages which had been consigned by 1 shipper to dime stores in 35 cities in 14 States and the District of Columbia, were intercepted. At New York several uncertified commercial shipments were caught which bore false labels as to contents, or were marked, "Not subject to inspection."

Transit inspectors of Central States hold meeting.--A conference of transit inspectors was held in Chicago on December 18 and 19, attended by inspectors from Washington, Cincinnati, Kansas City, Omaha, St. Louis, and Chicago, as well as by two Post Office Department inspectors, a representative of the Civil Service Commission, and a port inspector, all of whom participated in the program. J. M. Corliss, transit inspector in charge of the Central States region, presided at the meeting. An open discussion of problems that confront inspectors at the respective stations proved instructive in presenting various phases of the work with which the less experienced inspectors were not familiar. The necessity for conducting a survey of break-bulk houses located on all freight railway lines was agreed upon, and the mechanics of working out such a program were set up. A further study of mail and express trains was also worked out in order to coordinate the inspection of shipments. A method of keeping inspectors better informed of the program of work at other stations was arranged.

Tennessee makes provision for blister rust control areas.--Under a quarantine adopted by the Tennessee State Department of Agriculture on December 13, 1939, the commissioner is authorized to designate as blister rust control areas any areas in that State in which he determines that five-leaved pines, including those to be grown in a nursery or planted for reforestation, should be protected from white pine blister rust. All currant and gooseberry plants growing in any blister rust control area are subject to destruction. The quarantine further provides that five-leaved pine trees may be destroyed when *Ribes* in the vicinity are of more value than the pines, or when the cost of removal of the *Ribes* within the infective range would be greater than the value of the pines.

The citrus canker situation.--The citrus canker eradication project presents an encouraging situation in that no cases of the disease have been located in Texas for the last 15 months. Searching in December for canker on 18 properties on which considerable difficulty has been experienced with recurrent infections since 1935, inspectors were unable to find any indications of the disease. On 11 such properties in Brazoria County, only 13 small *Citrus trifoliata* seedlings were located. One such property has been plowed and planted to rice. The inspection work included old infected properties in Harris County and in Jefferson County, near Hamshire. Abandoned and escaped citrus trees continued to be located and destroyed. Owners of estates growing *C. trifoliata* as hedges are cooperating well with the program. Citrus-growing nurseries also were inspected in Brazoria, Harris, and Victoria Counties.

CONTROL INVESTIGATIONS

Methyl bromide fumigation of green lima beans.--Randall Latta reports that methyl bromide fumigation of green lima beans imported from Cuba, for the destruction of pod borer larvae (*Maruca testulalis* Geyer), has recently been placed on a routine commercial basis. From November 1 until December 15, approximately 15,000 hampers were fumigated upon arrival in New York. During the first part of December a new fumigation plant was completed in Havana, Cuba, and was put in operation by December 14; therefore, since that date all beans (approximately 12,000 hampers) have been treated before being exported from Cuba. Mr. Latta tested the new equipment and supervised operation of the plant for the first few fumigations. The crop for this year is estimated at 100,000 hampers, all of which will be treated.

BEE CULTURE

Pollen in nectar seems stimulus for brood-rearing.--The following is taken from a report by Frank E. Todd, Davis, Calif.: "We have been giving two of our colonies a large reserve of pollen paste and under those conditions brood-rearing has been sustained, but the unexpected result was that no great expansion took place. In one of these colonies we added a small amount of pollen to the sirup we were feeding and the brood nest expanded rapidly until it filled the available space in the lower comb. At the same time the colony next to it, which was given a large supply of paste, failed to expand its brood nest, but maintained it at about the same size. This suggests to us that it is the pollen in the nectar which acts as a stimulus to brood-rearing. This, we believe, is significant. In a third colony the queen had not been laying for 6 weeks, although we had been feeding it sugar sirup. It had a few cells of pollen reserve. To this colony we gave some pollen in the sugar sirup at 2 o'clock one afternoon. The queen was laying eggs very rapidly the following morning. Egg laying continued to expand until she had filled most of the lower combs. This colony has no pollen paste and we are waiting to see whether expansion will continue where the brood is not brought through. We can see the application of the principle involved in the expanding brood nests of colonies on certain honey flows, in which the nectar is inclined to be laden with pollen, such as certain fruit bloom, and perhaps dandelion. We can also imagine how a pollen reserve which is covered with honey may cause egg laying during winter due to the pollen which would be taken up in the honey."

Soybean flour, "Nutrisoy," has value as a supplement to pollen in stimulating brood-rearing.--C. L. Farrar and C. W. Schaefer, Madison, Wis., report effective stimulation of brood-rearing by feeding nutrisoy mixed with 50, 25, and 12.5 percent pollen. The 50 and 25 percent mixtures appeared to be equal to pure pollen, whereas the 12.5 percent mixture tended to become "leathery," and probably is not so readily available to the bees. Nutrisoy alone increased brood production for about 2 weeks, indicating that some essential material present in pollen may be obtained from the body reserves of the nurse bees. One hundred grams of pollen plus nutrisoy provided food for more bees than did 100 grams of pollen. Check colonies reared only a neglible amount of brood. The tests are being made with 18 colonies under greenhouse conditions. The materials are fed in moist cake form by mixing the dry foods with sugar sirup (50 percent). The cakes are placed over the brood combs and covered with paraffined paper to prevent drying. Reserve honey and water are available to each colony.

A 25-story structure not satisfactory substitute for isolated mating station.--Otto Mackensen, Baton Rouge, La., reports that yellow queens permitted to fly from droneless nuclei on the 25th floor of the State Capitol, at Baton Rouge mated normally and their dark worker offspring indicated that these queens had mated with black drones. The nearest known colonies containing drones of this color were some that had been placed on the ground near the building as part of the experiment. Most of the yellow queens permitted to mate after yellow drones were added to the nuclei produced workers as dark as the workers of the queens mated from droneless nuclei and usually darker than queens artificially mated with yellow drones.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

An interesting record for a wingless cranefly.--Alan Stone has recently received 2[illegible] specimens of the wingless cranefly (*Chionea primitiva* Alexander) which were trapped in a cave at Harpers Ferry, W. Va., by M. F. Briscoe, of Storer College. This collection is of interest because it is a little-known species, described from a single male collected at Owasco Lake, N. Y., and because of the unusual habitat for these specimens. They were found in 1 trap only, about 85 feet from the only known entrance to the cave, in total darkness, and no closer entrance has been found. Traps nearer the opening contained no specimens. Flies of the genus *Chionea* are usually found on the snow, and how these specimens got so far into the cave and why they congregated at the point where they were trapped is difficult to explain.

On a parasite of the so-called brown-banded roach.--Specimens of a parasite reared by R. A. Flock at Tucson, Ariz., in 1939, from eggs of the cockroach *Supella supellectilium* (Serville) have been identified by A. B. Gahan as *Anastatus blattidarum* Ferriere and the identification has been confirmed by Ch. Ferriere, of the British Museum, author of the species. The host cockroach is widely distributed and the parasite is now known to occur in the Sudan, Egypt, India, and in the United States. Specimens of this *Anastatus* have been taken at Beaumont, Tex., as well as at Tucson.

Changes in the names of two of the introduced species of Diprion.--Recently, R. B. Benson (Bul. Ent. Res., v. 30, p. 341, 1939) has proposed a new genus, *Gilpinia*, into which he has transferred the species *Diprion polytomum* and *D. frutetorum*. In accordance with this paper, the name for the European spruce sawfly now is *Gilpinia polytoma* (Htg.), while *Diprion frutetorum* becomes *Gilpinia frutetorum* (F.). The name for the introduced pine sawfly remains *Diprion simile* (Htg.).

Mating habit in an ant of the genus Eciton.--Among the interesting specimens of ants collected in connection with the Argentine ant scouting work conducted by the Bureau of Entomology and Plant Quarantine during 1931-33 is that of an *Eciton* (*Acamatus*) *carolinensis* Emery queen, which was collected while mating with a wingless male. The mated pair were taken from a rotten oak stump at Spartanburg, S. C., by D. E. Read on May 27, 1932. There are no records to indicate that such an incident as this has ever been observed before in the United States. Since two other wingless males were collected from the same nest as the mating pair, it may be that mating takes place within the parental colony, as is true with many species of ants.

Investigation of certain names of Corrodentia.--For several years it has been felt that the names of two common and widespread species of booklice, *Trogium pulsatorium* (L.) and *Liposcelis divinatorius* (Mull.), should be thoroughly investigated, to determine if the names in use by the Bureau were nomenclatorially correct. It was decided that the former species had been correctly named, but that *Troctes*, which had been used for the latter species, should be discontinued in favor of *Liposcelis* which has already been used by certain taxonomists. The investigation involved a study of the literature concerned with the original proposals and subsequent usage of the generic names Trogium Illiger, Atropos Leach, Troctes Burm., Lachesilla West., Clothilla West., and Liposcelis Motsch. The failure to designate genotypes and probable misidentifications of these small insects on the part of early authors was instrumental in bringing about the confusion. A. B. Gurney has recently outlined (Jour. Wash. Acad. Sci., v. 29, No. 11, pp. 509-515, 1939) the data which lead to the above conclusions. The use of the family name Trogiidae, instead of Atropidae, was also found advisable. Though there are no definite rules governing the use of ordinal names of insects, Corrodentia is preferred to Psocoptera or Copeognatha, which are used by some writers.

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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR JANUARY 1940

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VERN O. TAYLOR

Vern O. Taylor, associate pathologist, and Bureau representative in charge of barberry eradication in Wisconsin, died at University Hospital in Madison, Wis., on February 2, following an illness of short duration. He is survived by his wife, Mrs. Helen J. Taylor, a daughter Marion, and a son Vern.

Mr. Taylor was born March 4, 1903, at Manawa, Wis. After attending the Oshkosh High School he enrolled at the University of Wisconsin and in June 1930 received the degree of Bachelor of Science. Following graduation he accepted a position in the milling industry with headquarters at St. Louis, Mo., where he remained until receiving an appointment on January 15, 1931, as State leader of barberry eradication, with headquarters at Madison, Wis. He served the Bureau in this capacity until the time of his death.

His death represents a distinct loss to the Bureau and the community. He was an enthusiastic worker and enjoyed a wide acquaintance throughout Wisconsin and neighboring States.

He was a member of Delta Theta Sigma.

BUREAU APPROPRIATIONS

The bill to provide appropriations for the Department for the fiscal year 1941 passed the House and is now awaiting consideration by the Senate. As it passed the House it provides $5,644,301 for the Bureau, which is $829,134 below the budget estimates of working funds. The budget estimates for all supply bills included small amounts under each item for administrative promotions. These amounts have been eliminated from all of the supply bills so far considered by the House. The budget estimates for the fiscal year 1941 provided the following increases and decreases in amounts of the appropriations for working funds for the current fiscal year:

Increases

Mexican fruitfly control	$15,000
White pine blister rust control	100,000
A new item for the control of white-fringed beetle	600,000

Decreases

Fruit insects	$15,916
Sweetpotato weevil control	5,000
Forest insects (Work on azalea blight to be discontinued)	400
Truck crop and garden insects	15,000
Cereal and forage insects	16,700
European corn borer control	5,000
Pink bollworm control	382,808

The bill as it passed the House provides for reductions below the budget estimates for the following:

Mexican fruitfly control	$15,000
Dutch elm disease eradication	100,000
Forest insects	52,700
Barberry eradication	50,000
Insects affecting man and animals	31,500
Insecticide and fungicide investigations	9,981

It eliminates the new item for white-fringed beetle control and increases the item for control investigations by $5,000 for investigations on methyl bromide.

Under date of January 27 the President submitted an estimate of $3,000,000 under the general authorization for the control of incipient and emergency outbreaks of insect pests and plant diseases, for possible inclusion in the Deficiency Bill. This estimate has not yet been reported from the House Committee.

"MEDICAL FACILITIES"

Under date of September 1, 1939, the United States Employees' Compensation Commission was supplied with a mailing list of employees of this Bureau, revised to that date, to receive copies of pamphlet CA 76, "Medical Facilities," together with monthly supplements of changes in designated physicians and hospitals. Additional copies of this circular and supplements may be obtained upon application of the Commission through the Office of the Business Manager. The Commission is now distributing a revised edition of their Regulations in pamphlet form, effective June 1, 1938, as amended to June 30, 1939. This publication is being supplied to all Bureau employees whose duties necessitate reference to the Regulations in carrying out the provisions of the Compensation Act of September 7, 1916. Additional copies of this booklet may be had on application to the Office of the Business Manager.

FRUIT INSECT INVESTIGATIONS

Moth trapping in vineyards.--Dwight F. Barnes and George H. Kaloostian, of the Fresno, Calif., laboratory, completed on November 14 a record of the seasonal fluctuations in abundance of 5 species of moths in 7 vineyards in Fresno and Tulare Counties. The work was begun April 1, 1939. Collections from 21 malt-sirup bait traps, 3 in each location, were made at intervals of 3 and 4 days, and new bait was put out on each collection date. The following tabulation gives a summary of some of the data. In addition, a single specimen of the Mediterranean flour moth (*Ephestia kuehniella* Zell.) was taken.

Species	Total moths	Total females	Gravid females
	Number	Percent	Percent
Ephestia figulilella Greg-----	13,162	51	89
Ephestia elutella (Hbn.)------	69	91	65
Plodia interpunctella (Hbn.)--	22	32	71
Desmia funeralis (Hbn.)-------	5,813	54	94
Ephestiodes nigrella Hulst----	1,188	87	73

Effects of low temperatures on San Jose scale in Georgia.--Oliver I. Snapp reports that San Jose scale crawlers under gravid female scales were killed by a minimum temperature of 18° F. above zero on January 3 at Fort Valley, Ga. Experiments conducted at the Fort Valley laboratory showed that a minimum temperature of 16° above zero will not kill mature San Jose scales nor immature stages of this insect after the covering begins to form. Some mortality of these immature stages and the mature scales on peach trees was recorded at 12° abvoe zero, the percentage of mortality increasing at temperatures below that point.

MEXICAN FRUITFLY CONTROL

Conditions in the lower Rio Grande Valley.--Extremely cold weather for this area between January 18 and 24 severely damaged the present citrus crop. The temperature dropped to below freezing for at least short intervals daily throughout this period, and on the 23d a low reading of 21° F. was recorded at Weslaco. Estimates of the loss range from 15 to 90 percent in individual groves. Groves having had poor care suffered most. Defoliation was severe in young plantings and in older unthrifty trees. Fruit harvested immediately after the freeze arrived in the markets in good condition and the canneries were able to process a large quantity. Adults of *Anastrepha ludens* Loew were trapped in every district. Flies were taken after the cold weather in sufficient numbers to indicate that part of them had survived the cold weather. Throughout the month 247 adults were submitted for identification. Inspections to discover infested fruit resulted in the finding of one grapefruit which contained 1 larva of *A. ludens*. This is the first record of infested fruit having been found in January in the regulated areas.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Hessian fly resistance in wheat.--E. T. Jones, Manhattan, Kans., reports that in a fall test for fly resistance at Springfield, Mo., involving 56 strains of ordinary winter wheat and approximately 100 selections of Marquillo-winter wheat hybrids, 40 percent of the selections were less than 10-percent infested. Infestation in most of the winter wheats ranged from 70 to 100 percent. In another test series, involving 810 varieties and selections, principally of spring wheat, 113 strains were found to possess a fair degree of resistance. All of these had less than 50 percent of the plants infested. Thirty-four rows of checks consisting of the susceptible variety Ceres, occurring at 25-row intervals throughout the series, averaged approximately 100-percent infestation. Some selections of Triumfo, Marvel, Ivy Gelou, IVC1 ÷ #, and Illinois No. 1 W38 had no infestation. The selection Centenario had only 2 percent of the plants infested. These selections have exhibited resistance at Springfield over a period of several years.

JAPANESE BEETLE CONTROL

Indexing plants that withstand methyl bromide fumigation.--Preparatory to the listing of plants that successfully withstand methyl bromide fumigation and those that are injured by the gas, the treating section of the Division is indexing on cards all varieties of plants thus far fumigated, listing them according to quantity, date, temperature, size, whether potted, bare-rooted, or balled and burlapped, as well as the establishment at which fumigated. From these cards there will be made up an alphabetical list of plants for checking with nurserymen and with available information from other sources. There are now over 2,000 varieties indexed, under 236 genera. Before the list is compiled there will probably be nearly 3,000 varieties. There are very few reports of injury to fumigated plants. Many of these injured varieties may withstand the treatment when fumigated at the proper season and temperature. A total of 51,504 plants was fumigated throughout the Japanese beetle regulated area during January, bringing the grand total of plants fumigated to date to 636,518. On January 25 a demonstration was conducted at Arlington, Mass., with some winter-grown annuals. A fumigation chamber at a nursery at Little Silver, N. J., was completed for approval during the month. Another chamber at a Pittsburgh nursery was installed by a commercial firm during the month and is now ready for final testing. This same firm is constructing a chamber for a large Ohio nursery. Both of these chambers are of approximately 240-cubic feet capacity. An inquiry has been received from another nursery that plans this spring to construct a chamber large enough to fumigate a carload of stock at once. The nurseryman states that he intends to fumigate from 8 to 10 carloads as soon as the ground thaws enough for digging and wishes to complete these orders in from 2 to 3 weeks. The bulk of his material is yew and hemlock, both of which have reacted favorably to methyl bromide thus far. Two nurserymen in New York and 1 each in Connecticut and Pennsylvania are contemplating the construction of fumigation chambers in the near future, but are withholding actual construction until after the public conference to consider the Japanese beetle quarantine to be held in Washington on February 27.

Cold weather affects plant shipments.--In the northern districts of the Japanese beetle infested zone there was a complete cessation of plant movement, the ground being in no condition for digging and temperatures being too low to risk shipping. In the New York City area upwards of 30 inches of frost was reported in some localities. One grower of perennials in that section worked for 2 hours with a crowbar to get out 100 perennials that he wished to have inspected for shipment. Several New Jersey establishments reported that stock had been frozen in their storage sheds, an unusual occurrence for that State. Other shippers stated that western and southern shipments of stock had been returned because of freezing. Excellent prospects were reported by some of the large establishments in the area, with advance orders for as much as 15 carloads of evergreens, 100,000 azaleas, and $20,000 worth of general nursery stock. A southern New Jersey shipper has orders for his entire stock of a million asparagus roots. Another grower reports orders for 4,500 rhubarb roots. Both of these lots will require inspection.

Grower used fumigation chamber to control greenhouse pests.--A central Pennsylvania greenhouseman who has constructed an approved methyl bromide fumigation chamber for the purpose of obtaining Japanese beetle certification for his potted material is now utilizing the chamber to combat other pests that are infesting his stock. This grower reports that he has had considerable difficulty with whitefly and mealybugs on his pelargoniums and poinsettias. Using his fumigation chamber with a charge of one of the commercial cyanide compounds, he has been successful in ridding his plants of these two species. The plants came through the treatment without noticeable injury. These fumigations were entirely independent of those for Japanese beetle certification and the plants were returned to the greenhouses. In using the cyanide fumigant the blower was operated in the usual manner to aerate the chamber at the end of the fumigation period. This grower states that he intends to try methyl bromide for this same purpose when he has had an opportunity to figure out a smaller dosage than that used in fumigating plants for Japanese beetle certification.

Pamphlet issued describing construction details of an approved fumigation chamber.--A 20-page loose-leaf booklet containing photographs of an approved methyl bromide fumigation chamber, along with a description and plans for its construction, was issued to inspectors of the Division early in January. This booklet has been approved for distribution to nurserymen affected by the Japanese beetle quarantine regulations, who desire to erect such chambers.

Inspectors furnished with first-aid kits.--First-aid kits have been made a part of the equipment of each Federal car or truck used by Japanese beetle inspectors in their daily rounds.

Gypsy moth infestations in inspected shipments.--Three hundred and thirty seven gypsy moth egg clusters were found in a carload of lumber inspected at Madison, N. H., prior to shipment to Rochester, N. Y. Approximately 27,000 board feet of lumber was inspected in this heavily infested load. The greater part of the lumber had been piled near gypsy moth-infested hardwood trees. With edgings laid between each layer of boards, the piles furnished an exceptionally favorable location for oviposition on the under surfaces of the boards. There were more egg clusters on the lumber than on the nearby trees. An additional 46 egg clusters were removed from birchbark to be used in the manufacture of novelties, from old lumber to be used in doorways of carloads of cooperage, and from 4½ cords of birch fireplace logs, all of which were intended for destinations outside the regulated area. One egg cluster was also removed from old moss-covered wood inspected in the Portland, Maine, district for shipment to the New York City Sportsmen's Show.

Heavy movement of certified lumber.--Lumber inspections continued heavy throughout January. The infestation found on lumber was much heavier than a year ago. In January 1939, 53 gypsy moth egg clusters were found on 7 shipments of lumber and logs. During the current month, 448 egg masses were removed from 21 shipments of lumber.

Brown-tail moth infestations.--Winter observations in apple and pear orchards along the Connecticut River between Manchester and Concord, N. H., and in the vicinity of Portsmouth, N. H., indicate a considerable increase in brown-tail moth infestation in these sections. The district inspector at Bangor, Maine, has noted a wide variance in the size of brown-tail webs. Most of them are small. In most instances in that district the webs are widely scattered, often occurring singly in small, abandoned orchards.

First-record Dutch elm disease infection.--A first-record infection was reported late in the month in the town of Wallingford, New Haven County, Conn. This confirmed tree is located 1-3/4 miles north of the New Haven Town line, where three other diseased trees were found previously. This tree was first tagged while a scout crew was doing intensive sampling along the Quinnipiac River. At that time the crown of the tree was completely affected and dying back. This confirmation extends the sanitation activities into the built-up section of Wallingford, as well as farther up the river.

Dense bark beetle infestation in apparently normal elm.--Elm-sanitation crews in the eastern section of Orange County, N. Y., found several beetle-infested trees that appear to be alive at a distance of 50 feet, but which, upon closer examination, showed that they had died after setting buds. The trees were literally alive with Scolytus multistriatus Marsh. Very little woodpecker work was noted on these elms.

Filter-bed elm sanitation completed during freeze.--An elm-sanitation crew has completed their activities in those sections around the filter beds in Great Swamp near Ridgefield, Conn., which can be worked only while the beds are frozen. The low temperatures also permitted the completion of other sections of the Great Swamp that are practically impassable unless frozen.

Floods interfere with Dutch elm disease control work in Danbury district.--Heavy rain accompanied by thawing temperatures during the week of January 20 removed all snow and flooded the swamps and streams in the Danbury, Conn., district. Inspection of the Pomperaug River and its tributaries showed considerable spread of elm material suitable for bark-beetle infestation and the creation of additional probable beetle wood. At some points the river had spread back for a quarter of a mile from each bank, carrying large chunks of ice that debarked one side of a number of elms that had been left after pruning or inspection of beetle material. Rechecking of the complete area will be necessary, with removal of trees that are now potential beetle material.

FOREST INSECT INVESTIGATIONS

Water-gas tar shows promise as spray for protecting logs against Monochamus.--During the last summer, field tests were made in Petersham, Mass., by H. A. Bess and B. H. Wilford, to determine the relative effectiveness of certain chemical sprays for protecting green logs against insect damage. The logs were cut early in the spring of 1939 from trees felled by the hurricane of September 1938. Thirty-three decks of approximately 50 logs each were used in the study. In December all of the logs were sawed into lumber (about 88,000 board feet), each board was examined for insect and stain defects, and the degrade for these defects recorded. From these data the damage done by insects and stains was computed and studied on the basis of monetary loss, as well as on the basis of volume of lumber damaged. Some of the conclusions drawn from the study are as follows: (1) None of the sprays tested were effective in protecting green logs against bark beetles, flatheaded borers, or ambrosia beetles. (2) One of the sprays, water-gas tar, appears to have been effective against sawyers (*Monochamus*). (3) It is questionable whether spraying the logs individually before decking gave appreciably more protection than spraying the logs by decks. (4) There is evidence that green white pine logs cut after July 1 and stored on cool, shady sites were damaged very little by insects. (5) The data obtained at the time the logs were sawed showed that the estimate or measure of insect abundance and damage, obtained by barking 5 of the 50 logs in each of the decks examined in October, was not an adequate one for evaluating the effectiveness of the sprays. (6) The location of the log decks with respect to each other, even though relatively short distances were involved, apparently had an appreciable effect on the population density of some of the insects encountered; consequently, it is important to consider this point in the location of checks and replicates. (7) The loss in degrade due to insect and stain defects in the unsprayed check decks of white pine logs amounted to about $2.50 per thousand board feet of lumber, or about 7 to 9 percent of the original value of the lumber.

Consistency in egg laying by mountain pine beetle.--W. D. Bedard, Coeur d'Alene, Idaho, has found a marked consistency in the average number of eggs deposited by female mountain pine beetles during the last 3 years within the study areas on the Coeur d'Alene National Forest. During 1936 the average number of eggs per egg gallery was 50.05, with an average of 50.29 eggs per gallery during 1937 and 50.19 in 1938. Egg galleries ranged in length from 1 to 23 inches, with an average of 11 inches, most of the eggs being deposited between the second and twelfth inch.

Control of western pine beetle in Salmon National Forest.--J. C. Evenden, Coeur d'Alene, reports that an outbreak of the western pine beetle (*Dendroctonus brevicomis* Lec.) within the ponderosa pine stands of the Colson Creek drainage of the Salmon National Forest was revealed during a survey of this area during the past season. Although the situation was not overly severe, control measures were considered necessary and steps were taken to treat the infested trees. T. T. Terrell visited this area in January and spent several days in the training of forest officers in methods of spotting and treating. The project will be completed some time in March, with C. C. C. laborers.

Pityophthorus twig infestation found in northern California.--An insect infestation in the twigs of ponderosa pine reproduction was found by P. C. Johnson in August 1939, near Van Bremmer Well, on the Shasta National Forest, Calif., while on reconnaissance for the forest-insect-hazard inventory of the Berkeley, Calif., laboratory. The damage was confined to an area of from 10-20 acres, but nearly all small pines within this space were attacked. The injury consisted of the killing of the current twig growth on lateral and terminal branches by two scolytid beetles later determined by M. W. Blackman as Pityophthorus confinus Lec. and P. hopkinsi Blkm. At the time of examination the heavy broods were chiefly in the new adult stages, with a few pupae still present. All classes of reproduction were attacked, with apparently little choice shown between healthy or poor individuals. A serious frost the previous winter was believed to have been a contributing factor in the occurrence of this infestation.

Hazard inventory results used in planning forest management.--The usefulness of data collected by the Inventory of Hazard which, for the last 3 years, has been a project at the Berkeley laboratory, is being proved by application in plans for managing forest areas in California. This inventory secures figures on stand volumes, amount of insect-caused loss, and volume of timber in trees likely to die from insect attacks. K. A. Salman, Berkeley, reports that recently those figures have been used freely by the Forest Service in preparing management plans for a 209,000-acre tract of timber in Modoc County. The figures applicable to another 92,000-acre tract in the same county have been requested for use in preparing plans for the utilization of the timber on that area. Private lumber companies also are utilizing information that has been gathered by field crews. One company has requested and expects to use the inventory figures for loss and risk in preparing a program for the utilization of timber on a 75,000-acre tract in Shasta County.

Mealybug on Engelmann spruce.--During a survey of insect conditions made in November 1939 by Dwight A. Hester, Fort Collins, Colo., a mealybug was found to be infesting Engelmann spruce on Thousand Lake Mountain, Fish Lake National Forest, Utah. The trees in this stand of about 6,000 acres, situated at an elevation of about 10,000 feet, were heavily infested with this insect, which was later identified by Harold Morrison as Puto sp. The underside of dead limbs appeared white, and some living terminal shoots were nearly obscured by the cottony masses. Little is known about the damage this insect causes to conifers and, although the present unhealthy condition of the stand is thought to be caused by the mealybug, further study may show that other agencies are primarily responsible.

Bark-beetle attack and development in elm trees cut on different dates.--An experiment under the direction of C. H. Hoffmann, of the Morristown, N. J., laboratory, was begun in 1939 to determine the following with respect to the smaller European elm bark beetle (Scolytus multistriatus (Marsh.)) and the native elm bark beetle (Hylurgopinus rufipes (Eich.)). The experiment involved (1) the dates of earliest and latest attack in the field, (2) span and peaks of emergence of adults as dependent on date of attack, and (3) number of generations. Beginning on April 14, an elm tree was felled in the field at Chatham, N. J., every 2 weeks up to and including September 15, and after that one every week until October 27. After 2 weeks' exposure in the field, each tree was sectioned and the logs placed in rearing containers so that beetle emergence could be recorded. The tree felled on April 28 was heavily attacked by *H. rufipes* and issuance of the next generation of adults was heavy during July and August. Some adults continued to emerge even in October. A few adults of this species attacked trees cut on May 15 and June 16. Attack by *S. multistriatus* was generally heavy in all trees cut from May 15 to October 6, inclusive. Trees cut May 15 and May 31 produced large numbers of *S. multistriatus* adults during July and August. Those cut on June 16 and July 1 yielded most emergence during August and September. The one cut July 15 gave moderate emergence during September and October, while those cut July 31 and later yielded none, or only a few beetles in 1939. The tree cut October 6 was the last one on which *S. multistriatus* attack was noted. In many trees the bark beetles are overwintering as larvae. After the completion of adult emergence in 1940 more detailed data should be available concerning the points which were in mind when the experiment was started.

Dutch elm disease fungus spreads in bark-beetle-infested logs.--An experiment conducted in 1939 by W. D. Buchanan, of the Morristown, N. J., laboratory, indicates that the Dutch elm disease fungus may spread extensively from the point where it is introduced into an elm log by an adult of the smaller European elm bark beetle (*S. multistriatus*). Adults artificially contaminated with the fungus were caged near 1 end of each of 21 freshly cut elm logs in June. Each log was 10 feet long and all logs were free of the fungus at the beginning of the test. Other adults, free of the fungus, were allowed to infest the remaining portions of the logs. Later when the larvae that were the progeny of the contaminated and noncontaminated adults were nearly mature, the logs were cut into short sections and placed in bags. Still later, larvae and adult specimens were taken from these sections and cultured by C. S. Moses, of the Bureau of Plant Industry. The fungus was obtained from specimens that developed in sections from 1 foot to 8½ feet distant from the parts of the logs on which contaminated beetles were originally placed. It is not known how the fungus spread through the logs.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Gypsy moth work in areas adjoining barrier zone.--Dispersal of small caterpillars by the wind is one of the common means of spread of the gypsy moth. Exposed colonies on high elevations may be the cause of infesting areas several miles away. Because of this condition, and in order to reduce such spread into the barrier zone, considerable work is done by this Bureau in towns to the east of the barrier zone where especially dangerous infestations occur. Gypsy moth scouting crews are finding occasional small and widely scattered colonies in towns immediately east of the barrier zone, where the gypsy moth infestation has built up rapidly during the last 2 or 3 years and is now quite general. Every effort is being made to reduce the infestations at the most dangerous points so that the windspread into the zone may continue to be held in check.

Gypsy moth scouting on artillery reservation.--Scouting work has been under way for several weeks in a section of Jericho Township, Chittenden County, Vt., embraced by the U. S. Military Reservation, which is used for artillery practice. The reservation covers a large area that extends from Jericho into the townships of Underhill and Bolton. As has always been the case, satisfactory arrangements were made with the military officials at Fort Ethan Allen so that gypsy moth scouting work could be done in the reservation during the winter months, when the range was not in use. The gypsy moth scouts were cautioned not to disturb any unexploded shells that might be discovered, because of the danger of an explosion if the shells were touched or moved. These shells are exploded by trained Army personnel, using devices especially designed for that purpose. Although the section to be scouted this winter is heavily wooded and extremely rugged, it is expected that all necessary work will be completed before the resumption of artillery practice early in the spring.

Private work aids gypsy moth control.--The reduction of the numbers of species of trees and shrubs favored as food by the gypsy moth, and the encouragement of the growth of species less favored as food plants, is one of the methods used to reduce the gypsy moth population. Obviously, because of labor and cost limitations, this can be done only in comparatively small sections where special conditions render such work particularly desirable. However, it sometimes happens that work done by private agencies is of incidental assistance to this branch of gypsy moth work. Such a case recently occurred in Sheffield, Berkshire County, Mass., where a property owner started chopping out gray birch growth from a gypsy moth infested wood lot, to use as fuel, leaving a well-distributed stand of young white pine. As gray birch is one of the most favored food plants of the gypsy moth while white pine is much less favored, this work will contribute considerably to the development of a stand of trees which will be resistant to gypsy moth attack.

Small infestations found in Pennsylvania.--Scouting work has been completed at the three assembling cage sites in Dennison Township, Luzerne County, Pa., where male gypsy moths were captured last summer. No sign of infestations were found at any of the sites. Work around nine assembling cage sites in Kidder Township, Carbon County, has been completed, and resulted in the discovery of three infestations. Work still remains to be done around several additional cages that attracted moths in this township. A small gypsy moth infestation was located in a State Game Preserve in Lehigh Township, Lackawanna County. The site of this infestation is rocky, with inferior tree growth.

Efficiency of gypsy moth work demonstrated at Pennsylvania infestation.--Scouting work recently completed at an infestation in Lackawanna Township, Lackawanna County, Pa., revealed a decided reduction in the intensity of gypsy moth infestation from that of the previous year. Approximately 25,000 egg clusters were creosoted at this infestation last year, while fewer than 250 egg clusters were found this season. In addition to the creosoting, a part of this area was sprayed with lead arsenate last June.

Scope of brush burning in Pennsylvania.--Exceptionally fine conditions for burning brush prevailed in Pennsylvania during the first part of January, as a light blanket of snow had reduced the fire hazard to a minimum. An idea of the magnitude of this branch of gypsy moth work can be obtained from the work in one section of Spring Brook Township, Lackawanna County, where more than 500 piles of brush and deadwood were burned in 1 week in an area of approximately 37 acres. This represented only a small proportion of the brush burned in Pennsylvania during that short period.

C. C. C. gypsy moth work increases.--Since the hurricane of September 1938, the number of man-days taken from planned C. C. C. gypsy moth work and used on various types of emergency work made necessary by the hurricane has greatly exceeded the number of man-days left to gypsy moth work. The men have gradually been returned to gypsy moth work during the last few months until, during January, the number of man-days used on gypsy moth work reached the highest total since the hurricane, and the time used on gypsy moth projects exceeded the time taken from gypsy moth work for the first time. In Massachusetts, one entire camp, two crews from another, and one crew from a third camp are now being used on gypsy moth work and there is a possibility that the personnel of a fourth camp will be returned to gypsy moth work in the spring. In Connecticut, two crews from each of two camps and one crew from another camp are now employed on gypsy moth work, while one crew from a fourth camp was removed from gypsy moth work during the month. In Vermont two crews from one camp and approximately one-half the enrollees of another camp are now being used on gypsy moth work, with the possibility that a third crew may be added from the first camp. Plans of work calling for 152,600 man-days of gypsy moth work in Vermont, Massachusetts, and Connecticut have been compiled for the 15th and 16th periods, which begin on April 1, 1940, and the plans have been sent to the camps doing gypsy moth work under the supervision of this Bureau for inclusion in the work plans of the camps. With this labor it is planned to scout approximately 226,400 acres of woodland and open country, to apply burlap bands to the trees on 24,000 acres, and to do gypsy moth thinning and cleaning work on 6,105 acres.

Special silvicultural work being done in Connecticut.--Two crews of approximately 20 C. C. C. enrollees each, 1 crew from each of 2 camps, are now working in an area between the barrier zone and the Connecticut River in the southern part of Connecticut. They are doing silvicultural work, under the direction of the State Foresters, which will make the woodland areas less susceptible to gypsy moth increase. The work includes the reduction or elimination of the species of growth most favored as food by the gypsy moth and the encouragement of the growth of less-favored species.

PLANT DISEASE CONTROL

Barberry eradication.--Tom Van Zanden, leader in charge of barberry eradication in West Virginia, summarizes accomplishments for the calendar year 1939 as follows:

County	Maximum laborers	Man-days	Area covered	Properties cleared	Bushes destroyed	Salt used
	Number	Number	Sq.mi.	Number	Number	Tons
Berkeley-----	11	987	237.44	5	[1] 747	0.860
Greenbrier---	75	7,159	31.98	25	1,205,700	46.775
Jefferson----	11	872	136.89	4	[1] 224	.120
Monroe-------	88	8,236	13.28	92	10,899,584	407.080
Pocahontas---	13	776	10.14	2	[1] 33	.240
Summers------	24	3,057	4.55	35	3,680,651	124.009
Total------	222	21,087	434.28	163	15,786,939	579.084

[1] *Berberis vulgaris*, all others *B. canadensis*.

Salt brine used for eradicating native barberries.--During the last year the salt-brine method of eradication has been employed more extensively than heretofore. Prior to instituting this method on a large scale, field tests were conducted and the data obtained were largely responsible for the development of this activity to a point of major importance in the eradication of *B. canadensis*. The brine method of treatment was first employed on on a limited scale in 1938. A 1½-ton truck hauled barrels filled with water as near to the point of operation as possible and from there laborers carried it in 10-gallon drums to the site of eradication operations. A 600-gallon tank mounted on a 1½-ton chassis, powered to pump water into and out of the tank is now in use in this State. The motor-driven pump will force water for a distance of several hundred feet through a 3/4-inch hose, thus permitting the brine to be mixed at the point of application. While the use of brine is not practicable under all circumstances, experiences of the past year have shown that where water is readily available and topography will permit using the tank truck, the cost of applying salt in solution is a little more than half the cost of eradicating bushes with dry salt. There is a saving in both the amount of chemical used and in labor costs.

Three plant diseases added to list in West Virginia.--A notice received from J. B. McLaughlin, commissioner of the West Virginia Department of Agriculture, Charleston, W. Va., effective January 1, 1940, states: "The discovery of the London plane disease, a new and not heretofore known disease of the plane and sycamore, in this State, the expansion of the barberry-eradication campaign for the suppression of black stem rust of wheat, and the discovery of the cause of the death of the elms in the southwestern areas of the State, makes it necessary that these three plant diseases be added to the list of plant pests considered as dangerously injurious." No other change is made in the Regulations by this revision.

Blister rust control conference held in New York State.--A conference of the New York district leaders was held at Syracuse, N. Y., on January 24 and 25. In addition to the district leaders, the following men attended the meeting: H. L. McIntyre, State leader; Henry Clepper, executive secretary of the Society of American Foresters; J. A. Cope, extension forester of New York; E. W. Littlefield, in charge of forest investigations in New York; Ray R. Hirt, of the New York State College of Forestry; and Messrs. Rusden and Filler, of the Regional Office at Cambridge, Mass. Each district leader presented a summary of his accomplishments in 1939. These reports showed a decrease of 10 percent in man-days of employment during 1939 and an increase of 9 percent in the acreage protected over that of 1938, even though the Ribes factor was practically the same for both years. Professor Cope gave an instructive talk on "Woodland Management." Dr. Rusden reported on the results of blister rust infection studies made in New York during 1939, and E. C. Filler discussed "Administrative Matters and Special Control Problems in New York and Other States." Noble Harpp and H. G. Strait presented interesting papers on "Uses of White Pine" and "Reproduction of White Pine under Hardwoods." Preliminary work plans were developed for the 1940 field program and decisions were reached on several control problems.

Increased productivity of Ribes-eradication work in Northeastern States.--Final reports from the blister rust control leaders of the Northeastern States show that 700,141 acres were cleared of Ribes during 1939, a decrease of 5.6 percent from 1938. This decrease apparently was due largely to a loss of 21.7 percent in the number of man-days of employment, as compared with 1938. Although there was a slight increase in the number of Ribes per acre in 1939, an average of 4.4 acres was worked per man-day. This is an increase of 22.2 percent over 1938 and may be attributed to the following factors: Better training of laborers prior to application of control measures; close supervision; greater use of scout formation in favorable locations; and the stimulus of productivity ratings, which developed a friendly spirit of competition among the crews. In using the production quotients, it was continually emphasized that quality should not be sacrificed for quantity. Numerous checks on the field work during 1937 showed that the quality equaled or exceeded that of previous years.

Blister rust control in Southern Appalachians in 1939.--Ribes eradication was carried on in the 8 States of Delaware, Georgia, Kentucky, Maryland, North Carolina, Tennessee, Virginia, and West Virginia during 1939. In this work 3,129,928 wild Ribes and 100,923 cultivated Ribes were destroyed on 491,106 acres, with 34,218 man-days of labor. Of the above acreage 359,132, or 73 percent, was initial work. Blister rust control has been carried on in the national forests of this region since 1928 and in national parks since 1933. In 1939, Ribes bushes were eradicated on 151,072 acres of national forest lands and 13,723 acres of national park lands, the total acreage worked on Federal lands being 164,795, or 33 percent of the total acreage worked in the region. Nursery sanitation was carried on around 27 nurseries in 6 States. These nurseries contained 452,000 white pines. In this work 7,755 wild Ribes and 114 cultivated Ribes were destroyed on 7,836 acres. In Maryland and Virginia, where the blister rust has spread most, 466,754 white pines were examined and 17,112 trees were found infected. Of the latter, 2,704 were cut down because they were fatally diseased and 14,408 were treated by removing 70,558 cankers, an average of about 5 per tree. Preeradication surveys for white pines were carried on in all States, 495,320 acres of white pine being mapped.

COTTON INSECT INVESTIGATIONS

Insecticide tests against cotton insects.--G. L. Smith, A. L. Scales, and R. C. Gaines report the results of cage tests conducted at Tallulah, La., during 1939. The Division of Insecticide Investigations separated each of two samples of calcium arsenate into four fractions, according to particle size, and found a definite relation between particle size and water-soluble arsenic pentoxide, tested by the New York method. The coarsest samples contained the highest percentage and the finest samples the lowest percentage of water-soluble arsenic pentoxide. The calcium arsenates with the larger particles and higher percentage of water-soluble arsenic pentoxide produced higher boll weevil mortality than did the calcium arsenates with smaller particles and lower percentage of water-soluble arsenic pentoxide. The authors summarize an extensive series of cage tests conducted in 1939 as follows: "Positive correlations are shown between net boll weevil mortality and percentage of water-soluble arsenic pentoxide, by the New York method, with calcium arsenate fractions prepared by means of a centrifugal air separator. Ordinary commercial calcium arsenate was more effective against the boll weevil and cotton leaf worm than any of the four cryolites tested with or without wetting agents. The definite compound dicalcium arsenate was more effective against the boll weevil and the cotton leaf worm than was commercial calcium arsenates, mixtures thereof with sulfur, imported calcium arsenate, and basic copper arsenate. Calcium carbonate and sulfur appeared to be better carriers for calcium arsenate than lime. Calcium arsenate-sulfur mixtures caused a higher mortality of adults of *Lygus pratensis oblineatus* (Say) than did sulfurs alone. The addition of wetting agents to calcium arsenate and to cryolites did not affect significantly the insect mortality."

Winter activity of pink bollworm in lower Rio Grande Valley.--In order to determine the possible carry-over of the pink bollworm by continuous breeding on cotton from one crop to the next, L. C. Fife, with the aid of several assistants supplied by the Division of Pink Bollworm and Thurberia Weevil Control, has made examinations in the green fruiting forms of cotton during the fall and winter moths. After July 1939 examinations were largely confined to squares that had developed on the new growth of old cotton stalks where the plants had been cut off at the soil surface several weeks before. However, many green fruiting forms were also found on plants growing in waste places at the end of cotton fields or from scattered plants in old abandoned fields that had been in cotton a few years previous. Pink bollworm larvae in all stages of development have been found in the green fruiting forms of cotton every month from June to December 1939, inclusive. During the period January 18 to 26 a severe cold spell occurred, destroying all the green fruiting forms of both cotton and okra and making further investigations impossible.

Pink bollworm infestation in okra in lower Rio Grande Valley.--About 2,000 acres of okra are grown annually in the quarantine area of the lower Rio Grande Valley during the winter months for shipment of the green pods to markets further north. With the aid of assistants supplied by the Division of Pink Bollworm and Thurberia Weevil Control, Mr. Fife made examinations of green okra pods from August 1939 to January 1940, inclusive, to determine its importance as a host plant of the pink bollworm and the possibility of the pest being disseminated in commercial shipments of okra. Pods were found infested only during August, September, and October. The average percentage of mature green pods infested in any month did not exceed 0.7 percent and the highest percentage in any field was 6 percent. In young edible pods the highest infestation found was 3.4 percent. The results indicate that the pink bollworm does not carry over from one cotton crop to the next by continuous breeding on okra and that the pest is likely to be disseminated to uninfested areas further north in commercial shipments.

Crocidosema plebeiana in cotton and other Malvaceae.--With the aid of assistants from the Division of Pink Bollworm and Thurberia Weevil Control, F. F. Bibby made a study of occurrence of *Crocidosema plebeiana* Zell. in the green fruiting forms of cotton, okra, and 14 other species of malvacous plants in the lower Rio Grande Valley of Texas and Mexico. This species is of special interest, as its work and habits are almost identical with those of the pink bollworm and also because the larval stages so closely resemble those of this pest that they can be distinguished only by a careful examination of the arrangement of the setae. The mature larvae of this species are usually pinkish in color and the outer crochets of the abdominal prolegs are often weakly developed or absent, whereas in the pink bollworm the outer crochets of the abdominal prolegs are always absent. *C. plebeiana* feed chiefly inside the seed capsules and on the seeds; therefore the larvae are likely to be confused with the pink bollworm. Larvae of *C. plebeiana* in all stages of development have been found frequently in the green okra pods and only occasionally in green fruiting forms of cotton. It has also been found to occur commonly in other malvaceous plants as follows: *Abutilon berlandieri*, *A. hypoleucum*, *A. trisulcatum*, *Anoda pentachista*, *Hibiscus mutabilis*, *Malachra capitata*, *Malvastrum americanum*, *M. spicatum*, *Malvaviscus arboreus*, *M. drummondii*, *Sida angustifolia*, *S. cordifolia*, *Wissidula amplissima*, and *W. holosericea*. Identifications of the larvae were verified by C. Heinrich, of this Bureau.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Field clean-up in Glendale, Ariz., area.--Pink bollworm infestation was first established in the Salt River Valley of Arizona during the 1929 cotton crop. Infestation was eradicated from that area during the next few years but reappeared in the eastern part of that valley in the 1938 crop. No infestation was found in the Glendale section of the Salt River Valley in 1938, but during the 1939 crop season gin-trash inspection revealed that a fairly heavy pink bollworm infestation existed in approximately six fields near Glendale. In known infested Arizona areas it was found that infestation existed only in a very light degree in the 1939 cotton crop; consequently, arrangements were made to clean up approximately 3,000 acres of cotton land near Glendale with State and Federal funds, in cooperation with the farmers affected. This work was begun during the first few days of January and very good progress has been made. At the end of the month stalks had been cut and raked on the greater part of this acreage and several hundred acres had been hand-raked and hand-picked. The hand-raking and picking of cotton debris is being done only in fields actually known to be infested. Considerable difficulty was experienced in cleaning some of the fields that had been planted to SXP cotton. It appears that this variety of long-staple shatters much worse than does Pima. Several of these fields contained unusually large amounts of open cotton which had been beaten into the ground by previous rains and was partially covered by soil, making its removal very slow and difficult.

Destruction of soca cotton and random plants in south Texas regulated areas.--Field clean-up in south Texas was first applied in the lower Rio Grande Valley in 1937, and has been undertaken each year following the harvesting of the cotton crop. This policy was determined upon by Federal and State authorities following initial pink bollworm findings in the Brownsville-Matamoros area of Texas and Mexico in the 1936 cotton crop, in an effort to eradicate or suppress the infestation. Funds appropriated for control work in south Texas for the 1939 crop season made it possible to carry on an intensive campaign, following completion of the planned stalk-destruction program, to eliminate all seedlings and sprout cotton which developed after fields had been accepted as being in compliance. There is also a large amount of soca cotton in that area which it is necessary to eliminate in order to shorten the cotton-growing season and deprive the pink bollworm of food on which to live. "Soca" refers to sprouts growing from roots of cotton planted prior to the current crop season, and the old plants may or may not have been cut off near the ground. Much of the "soca" cotton grows in abandoned fields or where it persists in growing along with cultivated crops. The type of cotton now being eliminated is one of the major problems in control work in the lower Rio Grande Valley, where cotton as a rule develops and bears fruit throughout the year. This cotton must be grubbed out, and during January 26 crews were used in that work. Between January 18 and 27, however, temperatures were unusually low in the lower valley, severely damaging the tender parts of the cotton plants. Therefore all crews were laid off until the last few days of the month, when 11 crews were put back to continue the grubbing out of this cotton. Continuation of this work is essential in order that no squares be produced prior to the time when the 1940 planted crop comes into bearing. During January soca cotton was grubbed from more than 5,000 acres, and sprout cotton and seedlings were removed from approximately 18,500 acres of cotton planted in 1939. To date a total of 22,794 acres of soca has been cleaned and sprouts and seedlings have been grubbed from more than 29,000 acres of fields planted in 1939. Also, during January, soca cotton was grubbed out on several hundred acres of land in Coastal Bend counties, immediately adjacent to the lower Rio Grande Valley area.

Trap plots in the lower Rio Grande Valley.--As previously mentioned, uniform planting dates for the 1940 cotton crop have been established for the counties comprising the lower Rio Grande Valley of Texas and the heavily infested area of the lower valley of Mexico in an effort to strengthen the control program in that region. To supplement the benefits which may be derived from observance of the planting-date regulations, steps were taken by Federal and State authorities of this Department, and officials of the Mexican Department of Agriculture, to establish trap plots of cotton along both sides of the Rio Grande in the Brownsville-Matamoros area, where the heaviest pink bollworm infestation existed in the 1939 cotton crop. The purpose of the trap plots is to plant them far enough in advance of the 1940 cotton crop that the plants will reach the fruiting stage several weeks earlier than the main crop, and attract emerging moths, drawing them away from commercial cotton when it begins to fruit. About the middle of January, 15 of these trap plots, consisting of about ½ acre each, were planted on the Texas side of the Rio Grande and 12 plots were planted on the Mexican side. All blooms will be picked from these plots each day, to avoid possibility of propagation, and at the proper time all plots will be destroyed.

Wild-cotton eradication.--Since 1932, when it was discovered that wild cotton growing in southern Florida and adjacent islands was infested with the pink bollworm, from which it was being disseminated to domestic cotton plantings in northern Florida, a determined effort has been under way to eradicate this insect from that region. Extermination of this pest is being attempted by the only known method of control--destruction of its host, wild cotton, and considerable success has been obtained in the elimination of this plant and the consequent reduction in pink bollworm infestation. Good progress was made in this work in all areas during January, and in the Cape Sable area, where a C. C. C. camp has been established to aid in wild-cotton eradication, the enrollees showed considerable improvement in efficiency over December operations. In addition to the company of C. C. C. enrollees operating in the Cape Sable area, 12 W. P. A. crews operated on the main keys and along the west coast, and 2 Bureau crews carried on eradication work from a houseboat in remote areas inaccessible by land. For the period about 5,300 acres were covered, from which approximately 8,600 mature plants, 359,700 seedlings, and 1,665 sprout plants were removed. In January incidental inspections of wild cotton bolls, squares and blooms, were made from time to time throughout the area by the various inspectors operating in the field. As a result of such inspection, 1 pink bollworm was taken at a point in the extreme western portion of the Cape Sable area and 2 specimens were found in the Florida Bay section.

Thurberia-plant eradication.--A plant known as *Thurberia thespesioides*, closely resembling wild cotton, exists in many of the mountain ranges of southern Arizona. This plant is heavily infested with a weevil which also attacks commercial cotton and is a possible host to the pink bollworm. In 1935 it was found that this weevil was making its way from these wild plants in the Tortillita and Santa Catalina Mountains to domestic cotton plantings in the Santa Cruz Valley, these two ranges at that time constituting all of the area which drained into the vicinity of cultivated cotton. A program was therefore initiated in 1935 to eradicate these plants from these two adjacent mountain ranges in an effort to prevent the spread of this insect to cotton-producing sections throughout the United States. Funds for this project have been provided principally through W. P. A. allotments, and this work has been carried on to the present time with good success. The first coverage of these two ranges was completed several months ago, and a review of the region was at once begun to ascertain whether any plants had been missed and to remove any sprout or seedling plants that might have developed since the first cleaning. The recheck of the Tortillitas was completed during the latter part of January and the Santa Catalinas was immediately reentered for a second coverage. The second cleaning of these mountain ranges indicates that very few plants were missed during the initial coverage and that comparatively few sprout plants and seedlings have developed since.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Distribution and intensity of tobacco moth infestation in growers' pack houses.--A survey conducted during the season of 1939 by C. F. Stahl and W. A. Thomas, of the Oxford, N. C., laboratory, disclosed that no established infestations of this pest occur in either the Georgia or the South Carolina Tobacco Belts. In the Eastern Belt little economic injury has occurred, except in the immediate vicinity of Farmville, N. C. Light infestations occur, however, in the vicinity of Wilson and Greenville, N. C., with a very localized infestation at Kinston. Scattered infestations were also found in the area extending from Farmville to Greenville. The principal economic injury in the Middle Belt occurs in the Durham, N. C., area, extending northeastward to Creedmoor and north to Rougemont, with lighter infestations for an undetermined distance beyond these limits. The degree of infestation was found to decrease in the area south, east, and west of the Durham area. A fairly heavy infestation occurs in Johnston County, N. C., with its focal point just south of Wendell and extending in a lesser degree to within a few miles of Selma. By far the largest single infested area seems to occur in the Old Belt extending intermittently from Winston-Salem to Reidsville, N. C., Danville, Va., and Chatham, Va., with two apparent focal centers located at Reidsville and Danville. The principal economic injury occurs in the vicinity of these two focal centers. A light infestation is present in the vicinity of South Boston, Va., in Halifax County, with a few isolated infestations in Mecklenburg, Henry, and Patrick Counties, Va. In general, there has been no increase in the intensity of tobacco moth infestation in growers' pack houses in 1939, as compared to 1938.

Temperature and humidity affect action of pyrethrum sprays against beet leafhopper.--In summarizing the results of laboratory tests designed to determine the effects of temperature and humidity on the insecticidal action of pyrethrum sprays against the beet leafhopper, F. H. Harries, J. D. DeCoursey, and R. N. Hofmester, of the Twin Falls, Idaho, laboratory, report that the percentage of leafhoppers killed by a pyrethrum-oil spray was significantly greater at temperatures of 60° F. than at higher temperatures of approximately 100°. Also, that a distinct trend was exhibited toward a greater percentage of leafhopper kill at lower relative humidities than at higher relative humidities, although the observed differences were not statistically significant in all instances. Significant differences in percentage of leafhopper kill were obtained, however, in comparing results at relative humidities of 20 and 80 percent, when exposed to a temperature of 60°. The effect of extremes of 20 and 80 percent relative humidity was comparatively slight in comparison wih the influence of temperature differences in a range of 40°. The pyrethrum-oil sprays used in these tests consisted of 1 part of pyrethrum extract, containing not less than 2.5 percent of pyrethrins by weight, or 2 grams per 100 cc., to 500 parts of oil. Pyrethrum proved to be more effective in a base of light oils than in heavier oils, and the efficiency of sprays at higher temperatures was not increased by using heavier oils. A higher mortality was obtained when the leafhoppers were sprayed at 100° than at 60°, when the treated insects were placed immediately after treatment under the same temperature-humidity conditions (80° and 50 percent relative humidity) and held under these conditions for 24 hours. It appeared that most of the insecticidal action of the pyrethrum-oil spray was caused by the pyrethrum, but the oil content was also shown to have some action. The effect of temperature on the efficiency of pyrethrum-water sprays used in these tests, consisting of 1 part of pyrethrum extract to 400 parts of distilled water, was similar to that found with pyrethrum-oil sprays.

Gladiolus thrips controlled with reduced dilution of tartar emetic.--As the result of experiments performed during the season of 1939, G. V. Johnson, of the Beltsville, Md., laboratory, found that sprays made up at the rate of 2 pounds of tartar emetic and 4 pounds of brown sugar per 100 gallons of water gave a degree of control of Taeniothrips simplex Morison equal to the formerly recommended dosage of 4 pounds of tartar emetic and 16 pounds of brown sugar per 100 gallons of water. Also, it was determined in a series of comparative tests, that a commercially prepared calcium antimony tartrate could be substituted for tartar emetic, provided an equal quantity of antimony was present in the spray.

Lime-sulfur sprays and bentonite-sulfur dust mixtures effective against red berry mite.--B. J. Landis and W. W. Baker, of the Puyallup, Wash., laboratory, report that an analysis of the results obtained in experiments in 1939 demonstrated that a satisfactory control of *Eriophyes essigi* Hassan could be achieved in fields that had not been sprayed for the control of this mite during the previous year, by making either 2 applications of lime-sulfur (6-100) spray, or bentonite-sulfur dust mixture. The latter appears to be an excellent substitute for the lime-sulfur against the mite. The addition of a sticker to lime-sulfur appeared to increase slightly the degree of control obtained. Experiments in adding various materials, particularly manganese sulfate, aluminum sulfate, iron sulfate, and magnesium sulfate, to lime-sulfur sprays just prior to blooming, in an attempt to overcome the shock caused by sulfur on brambles indicated that (1) the leaves produced on blackberries where iron sulfate was applied were of a darker green than leaves on plots where this material had not been applied or from plots where the other listed materials were applied; (2) aluminum sulfate appeared to damage the developing flowers and fruit; and (3) a greater number of mite-infested berries were found in plots where these materials were applied than in plots where they were not applied. In general, none of the materials corrected the slight yellowing of the foliage ordinarily attributed to the application of lime-sulfur for red berry mite control. It was found that the application of various oil sprays were less effective than lime-sulfur sprays in protecting the plants from the red berry mite throughout the season in instances where a single application was made to plants at the time the cane buds were opening.

Insufficient curing renders narcissus bulbs susceptible to injury from hydrocyanic acid gas.--C. F. Doucette, of the Sumner, Wash., laboratory, reports that during the 1939 season three separate instances were reported to him of injury to narcissus bulbs that had been fumigated with hydrocyanic acid gas to kill larvae of the narcissus bulb fly (*Merodon equestris* (F.)). His investigation confirmed suspicions that the fumigant was the primary cause of injury, but it was also evident that certain physical conditions rendered the bulbs susceptible to such injury. In one instance the roots of the bulbs were still quite plump and moist when the bulbs were fumigated, indicating that the moist condition of the bulbs at the time of treatment was the causative factor. Although the other two instances involved possible causative factors other than insufficient curing, the character of which could not be determined definitely, a variation in the degree of injury to the injured varieties of bulbs, as well as an absence of injury to other varieties of bulbs included in identical fumigations, indicated distinctly that some physical condition of the affected bulbs was the principal cause which rendered them susceptible. Insufficient curing before fumigation is the most probable condition responsible for the injury. Although no injury to narcissus bulbs from hydrocyanic acid gas fumigation, at the recommended dosages and duration, had been observed prior to 1939, these instances of injury emphasize the danger of fumigating bulbs with hydrocyanic acid gas before they are sufficiently dried.

Amyl salicylate more effective and less expensive than isoamyl salicylate as attrahent for hornworm moths.--L. B. Scott and Joe Milam, of the Clarksville, Tenn., laboratory, report that, as a result of testing

80 materials for their chemotropic value in attracting adults of the hornworms Protoparce quinquemaculata (Haw.) and P. sexta (Johan.), amyl salicylate was found to be much more effective, as well as less expensive, than isoamyl salicylate. In grading the relative degree of attractiveness of these materials it was found that n-butyl benzoate, benzyl salicylate, isoamyl benzoate, benzyl alcohol, and amyl benzoate possessed about the same degree of attractiveness to the moths as did isoamyl salicylate. Nine other materials, consisting of isoamyl butyrate, benzyl butyrate, isobutyl benzoate, n-butyl salicylate, benzyl propionate, amyl butyrate, old benzyl alcohol, butyl salicylate, and isobutyl salicylate, were found to be moderately attractive to the moths.

INSECTS AFFECTING MAN AND ANIMALS

Sand flies may have long developmental period.--J. B. Hull and S. E. Shields, of the St. Lucie, Fla., laboratory, report: "Sand flies emerged from one cage over a period of 428 days, the longest period of time, and from another over only 90 days. This shows that the egg and larval stage of Culicoides furens (Poey) (= dovei Hall) can last as long as 428 days. The cage producing sand flies for that time has not produced any for 163 days, showing that no larvae have migrated under the cages in that period of time. This indicates that the sand flies that did emerge under that cage were those either in the egg or larval stage at the time the cage was placed."

Sulfur-cube ineffective against winter tick.--H. E. Parish, of the Menard, Tex., laboratory, finds that spraying cattle infested with Dermacentor nigrolineatus (Pack.) with the following mixture resulted in little or no kill: Wettable sulfur, 100 pounds; derris powder (5% rotenone), 10 pounds; water, 1,000 gallons. This is the formula found effective as a dip for controlling the short-nosed cattle louse.

Methyl bromide as mosquito ovicide.--H. H. Stage and C. M. Gjullin, of the Portland, Oreg., laboratory, report: "On November 29, 1939, four tracts of land heavily infested with eggs of Aedes vexans Meig. and A. lateralis Meig. were treated with methyl bromide which had been dissolved in alcohol and diluted with water. Soil from these tracts which had received the highest dosage (21.8 pounds methyl bromide per acre) was brought in 36 days later and put through the egg-separating machine. It appeared that a normal number of eggs were recovered, and they showed no signs of injury. These eggs were flooded with asparagine-phosphate solution, and 81.3 percent of them hatched. Eggs were also obtained from check tracts which had not been treated with methyl bromide and when flooded with asparagine-phosphate solution gave a 77.3-percent hatch."

FOREIGN PLANT QUARANTINES

Increase in disinfection of imported plant material at New York.--December 1939 was a banner month for the port of New York insofar as commodities disinfected were concerned. During that month 2,240 bales of cotton, 2,010 bales of cotton waste, 10,512 bales of linters, 9,077 hampers of lima beans, 1,240 crates of pigeonpeas, 84 cases of begonia bulbs, 7,207 cases of chestnuts, 3,337 cases of cipollini, and 490 bales of broomcorn were treated as a condition of entry.

Air express records broken by "California Clipper."--All air express records were broken by the trans-Pacific "California Clipper" when she arrived at San Francisco from China via Honolulu on December 30, carrying 485 packages of express matter. Of this total, 114 packages contained plant material subject to inspection. While the contents of these packages consisted entirely of cut flowers and flower leis, they represent a potential pest introduction hazard in that nearly 50 species of insects have been intercepted in the past on similar shipments, many of which are of economic importance and not known to occur in California or, in some instances, not even in the United States. Present shipments are arriving under certified-origin disinfection, with the result that few are now being intercepted carrying live pests.

Mosquito intercepted on "China Clipper."--A live mosquito, *Culex quinquefasciatus* Say, was taken in the passenger quarters of the Pan-American Airways trans-Pacific "China Clipper" arriving from Hawaii. This species is recorded as a carrier of a disease of humans, "filariasis," more commonly known as "elephantiasis."

Infested fruit intercepted on passenger train.--A Mexican woman residing in San Francisco, Calif., came in at El Paso on the passenger train from Mexico on the morning of December 3, 1939. She had in her possession as baggage one suitcase and three large paper bags. Inspector C. M. Locke made the usual inquiry as to whether she had any fruits, vegetables, or plants in her baggage or possession, to which she replied, "Nothing." It was noticed, however, that she appeared to be nervous after being questioned. Examination of the contents of the suitcase revealed no prohibited plant material. As the inspector proceeded to examine the paper bags, the woman showed considerable interest. In fact, she appeared to be more helpful than the occasion required. This aroused the inspector's suspicion and he placed the three paper bags on a vacant seat across the aisle, where they could be examined in her presence but without interference. In the last bag inspected one guava and half of an unidentified Mexican fruit were found. In the guava were three dipterous larvae which have been identified as *Anastrepha* sp. No infestation was found in the unidentified fruit.

Restricted plant material from China.--On November 9 there arrived at the Canadian border port of Blaine, Wash., a package of "fresh vegetables" on the express manifest from Vancouver, British Columbia, consigned to a firm in San Francisco. For "fresh vegetables" to be sent from Canada to California in November did not seem exactly correct, and the customs inspector felt it would bear looking into. The examination revealed a top layer of 20 or 30 leaves of kale (fresh vegetables), and under the kale was a layer of excelsior with 61 narcissus bulbs (Chinese sacred lily). The bulbs were confiscated by the customs and destroyed.

Prohibited fruits from Cuba intercepted at New York.--When the S. S. *Quirigua* arrived at New York on November 26 from Cuba a shipment of 556 packages of tomatoes and 1 package of sour limes, consigned to a New York firm, were offered for entry. The limes were not in a commercial package commonly used as a container for such products, but were packed in a lug of the type used for tomatoes and were apparently included as a present to a representative of the importing firm. An attempt was made to obtain delivery of the package of limes on Sunday night, the night of arrival, but this was refused by customs. Early next morning the drive of the importing company picked up some packages of tomatoes for the auction and also took the lug of limes, presumably believing it to be tomatoes. When the plant quarantine inspector reached the dock an effort was made in cooperation with the customs inspector to locate the package of limes. Being unsuccessful, they realized that this package had been delivered to the auction rooms along with the packages of tomatoes, and the importing firm was ordered by customs to return the package to customs custody. The following day an examination of this package revealed the presence of 14 white sapotes wrapped in tomato wrappers and also a considerable quantity of loose paper between the sapotes and the sour limes. The entire package containing the limes and sapotes was seized and destroyed. The importer disclaimed any knowledge of the prohibited fruit in this package and, upon request, instructed his shippers in Cuba to discontinue the forwarding of prohibited fruits.

Entomological interceptions of interest.--Two living larvae of the trypetid *Anastrepha mombinpraeoptans* Sein were intercepted at San Juan, P. R., on August 24, 1939, in *Spondias* sp. in baggage from St. Thomas, American Virgin Islands. Adults of *Bruchus loti* Payk. were found at Mobile, Ala., on December 12, 1938, in rye-straw jackets contaminated with vetch in cargo from France. A living specimen of the lygaeid *Ligyrocoris nitidicollis* (Stal) was taken at Laredo, Tex., on November 1, 1939, on a marigold in baggage from Mexico. A living adult of the weevil *Calendra phoeniciensis* (Chittn.) arrived at El Paso, Tex., on November 2, 1939, on a mustard leaf in cargo from Mexico. Living specimens of the turnip gall weevil (*Ceutorhynchus pleurostigma* Marsh.) were taken at Houston, Tex., on July 29, 1939, in turnips in ship's stores from Sweden. Living specimens of the scale insect *Lepidosaphes chinensis* Chamberlin were intercepted at San Francisco, on November 6, 1939, on *Pandanus* sp. in the mail from China. A living adult of the platypodid *Tesserocerus dejeani* Chapuis arrived at New Orleans on July 27, 1939, in a primavera (*Tabebuia donnell-smithii*) log in cargo from Honduras. A living adult of the bostrichid *Micrapata scabrata* (Er.) was found at Washington, D. C., on October 9, 1939, with corn on the cob in the mail from Peru. Living specimens of the mite *Eriophyes plucheae* Cook were taken at Boston on April 18, 1939, on leaves of *Pluchea odorata* in the mail from Barbados. A living adult of the bruchid *Acanthoscelides dominicanus* (Jak.) was intercepted at New York on November 3, 1939, in seed of divi-divi (*Caesalpinia coriaria*) in cargo from Nicaragua.

Pathological interceptions of interest.--A Chinese pomelo bearing several lesions of citrus canker (*Bacterium citri* (Hasse) Doidge) was incepted in baggage on December 28 at Blaine. A rust found on leaves of *Polypodium plesiosorum* from Mexico and sent in from Brownsville on November 2 has been doubtfully determined as *Milesia laeviuscula* (Diet. & Holw.) Faull. *Mycosphaerella citrullina* (C. O. Sm.) Gross. was intercepted at New York on January 3, on cucumbers in cargo from Cuba, on January 16 on muskmelon in stores from Venezuela, and on January 25 on one hairy squash of a crate in cargo from Cuba. *Phyllachora cynodontis* (Sacc.) Niessl. was found at New York on January 15 on *Cynodon dactylon* from India carried for use as bedding in an animal cage. *Phyllosticta antirrhini* Syd. was found on leaves of snapdragons from Cuba on January 25 at New York. During

January thousands of lugs of tomatoes were imported from Cuba through the Port of New York and inspection showed scattering specimens of rot determined as *Phytophthora terrestris* Sherb. A few specimens of the *Rhizoctonia bataticola* (Taub.) Butler rot of melons from Chile were found at New York in shipments received the latter part of January. *Septoria endiviae* Thuem. was found on escarole leaves in stores from Italy on January 13 at New York. The rust *Uromyces striatus medicaginis* (Pass.) Arth. was found on leaves of alfalfa hay from Argentina on December 31, at New York.

DOMESTIC PLANT QUARANTINES

Grasshopper and Mormon cricket control projects consolidated at Denver.--The field headquarters office of Mormon cricket control, formerly located at Salt Lake City, was moved to Denver on February 1 and combined with the field headquarters office for grasshopper control, with offices at 820 Insurance Exchange Building, 810 14th Street. The projects are under the general direction of B. M. Gaddis, of this Division, with Claude Wakeland continuing as field director of both projects. R. A. Roberts, project leader on Mormon cricket control in 1939, is assistant project leader of the combined activities. The character of control operations and the overlapping of the area infested by these two pests have made the consolidation of the work advantageous from an administrative standpoint.

Grasshopper and Mormon cricket control workers hold conference.--For the purpose of establishing broad fundamental policies under which the control of grasshoppers and Mormon crickets may be carried out under cooperative programs in the current year, Lee A. Strong called a conference of Bureau workers, commissioners of agriculture, extension workers, and other representatives of the various infested States, at Denver on January 9 and 10. A plan of operation presented by B. M. Gaddis outlined the general principles under which any control operations might be conducted in the crop year of 1940. This plan further provides for subsequent meetings in each State having an important grasshopper problem, in order to formulate a memorandum of understanding of the details of operation for the State concerned. Reports of the results of the 1939 campaigns against the 'hoppers and crickets were presented by leaders of these respective projects, and the power machine recently designed by the Bureau for spreading grasshopper bait, and the construction plans of which are being prepared, was demonstrated. Eighteen States were represented at the conference.

Indians and C. C. C. boys help control Mormon crickets.--Indians at 11 agencies helped materially last season in dusting, spreading bait, and erecting barriers against Mormon cricket advances. This work, together with the equipment and dusters supplied by the Indian Service, is valued at over $13,000. Boys in C. C. C. camps of the Division of Grazing of the Department of the Interior, of the Forest Service, and of the Soil Conservation Service, did similar work, and these agencies also furnished trucks, storage, camp equipment, and other supplies. The total contributions from all these Federal sources amounted to over $32,900.

Contributions to Mormon cricket control by various agencies.--In reducing to a percentage basis the contributions made to Mormon cricket control in 1939, it is found that the total contribution by the Bureau was

69.7 percent, a figure slightly above the 66 2/3 percent goal which we have tried to maintain during the last 2 years. The remaining percentage was provided by States, counties, individuals, and other agencies.

The peach mosaic situation in California.--All mosaic trees have been removed, up to January 27, from approximately 85 percent of all the properties in California on which the disease is known to exist. Of the diseased trees found, 75 percent have been removed. All known infected trees have been removed with the owner's approval in the counties of Imperial, Los Angeles, Orange, and San Diego.

Phony peach quarantines may be lifted from 2 entire States and 24 counties in other States.--No phony peach disease having been found in the last 3 years in Indiana or Pennsylvania, nor in 24 formerly infected counties in Illinois, Kentucky, Missouri, and North Carolina, notices have been sent to pest-control officials of peach-growing States that the designated States and counties are eligible for release from standard quarantines. While a substantial number of counties in the more heavily infected States have also been found free from the disease for 3 years, it is not considered advisable as yet to release them from quarantine.

January work on the peach disease project.--The removal of phony trees in Georgia and of mosaic trees in California and New Mexico went forward in January, and abandoned trees were taken out in Alabama, Arkansas, Colorado, South Carolina, Tennessee, Texas, and Utah. Over 2,000 mosaic trees in California were removed during the month. In Georgia 7 additional counties were practically cleared of phony trees. The relief laborers averaged 577. State and county participation was represented by 3 field supervisory employees each in Alabama and Georgia, 1 in Colorado, and 1 office worker in each of the States of Alabama and Georgia.

Land-clearing for control of white-fringed beetle.--Joint Federal-State W. P. A. projects have recently been approved in Louisiana and Alabama, and crews of laborers are now clearing land of brush and debris in order to place the ground in satisfactory condition for the application, during the active control season, of herbicides and insecticides.

Property owners cooperate in white-fringed beetle control program.--Throughout the areas infested with the white-fringed beetle, contacts have been made with property owners for the purpose of developing cropping programs with farmers so that the most effective type of control may be conducted. Many owners of heavily infested fields have modified their farm practices and released the land to the project so that clean-cultivation methods may be applied. In many cases these releases cover a period of 2 years. Detailed programs as applied to each infested area are being worked out with the assistance of cooperating State officials.

White-fringed beetle certification requirements temporarily lifted for potatoes and sweetpotatoes.--Soil-free potatoes may be shipped until May 1, 1940, without certification under the white-fringed beetle quarantine, from any part of the regulated area, and soil-free sweetpotatoes may be so shipped without the certificate until June 1, 1940. The above modification was authorized in a revision, on February 2, 1940, of circular B. E. P. Q. 485. The restrictions on soil, earth, sand, clay, peat, compost, and manure, remain in effect throughout the year when shipped interstate from any part of the regulated area.

Progress in sweetpotato weevil eradication.--The low temperatures which prevailed during the latter half of January throughout the areas in which sweetpotato weevil eradication activities are conducted in Georgia, Mississippi, Alabama, and Texas caused such wide destruction of remaining host material, which had been plowed up in the fields for this purpose, that it is believed the weevil population has also been reduced. During the month host material was destroyed by State-sponsored W. P. A. units in Alabama, both on the mainland and on islands where wild host plants are prevalent. Such work also went forward in Thomas County, Ga., and in eradication and control areas in Mississippi. Bureau inspectors carried on inspection, eradication, regulatory, and educational activities. They inspected over 500 properties in January and found 18 new infestations. An inspector of the Georgia Department of Agriculture, at the invitation of the county agent of Thomas County, Ga., discussed the sweetpotato weevil eradication project over radio station WPAX on January 27.

Gregg County, Tex., released from sweetpotato weevil quarantine.--Inspections in Gregg County, Tex., in areas previously infested, and in the vicinity of such areas, have failed to show a sweetpotato weevil infestation in the last 12 months. All properties in the county, we are informed, have accordingly been released from quarantine, and owners cautioned to maintain sanitation conditions and take such precautions as are necessary to prevent reinfestation.

Citrus canker work in Texas and Louisiana.--Following the policy of the last several seasons, the Bureau inspectors on citrus canker work were assigned to activities in Texas during the fall and winter, and at the close of January they again took up the work in Louisiana, jointly with 3 State inspectors. During the month the force of 9 Bureau inspectors, 1 Texas inspector, and 100 relief employees worked 17 old infected properties in Galveston and Brazoria Counties, Tex., and found 11 of them are apparently remaining free from citrus seedlings. On 6 of the properties, 48 escaped Citrus trifoliata seedlings were found and destroyed. Over 2,000 other properties in the noncommercial area of Texas were also inspected, and over 16,000 abandoned citrus trees were destroyed. The severe cold of the month appears to have greatly damaged if not destroyed citrus trees, other than the trifoliata species, in the vicinity of Houston.

Transit inspectors meet in Washington.--A conference of transit inspectors from New York, Pittsburgh, Boston, Philadelphia, Springfield (Mass.), Jacksonville, and Chicago was held at Washington on January 29-30 and resulted in a more comprehensive idea on the part of the more recently assigned men of the nation-wide aspect of the project. Of special importance was the plan to effect closer coordination of activities between the stations and regions to avoid duplication of inspection, thereby enabling inspectors at each station to concentrate on trains and shipments that would not be seen at any other point.

Transit-inspection activities in midwinter.--Narrative reports for the month of January include the statement that Philadelphia inspectors in the year 1939 conducted inspection at 19 points in the area of that city. Of the 92,000 shipments inspected by 3 inspectors at those points, 242 violations were found. The Atlanta inspector reported that the record-breaking snowfall and extreme cold in January so affected the nursery-stock shipping that even the rose nurseries in Texas curtailed their shipments to Florida and other southern points. At Pittsburgh the inspector took advantage of the usual lull in nursery-stock shipping in January and made a study of the inspection tours for possible improvement, and also renewed contacts with agents of carriers in the interest of spreading quarantine information. The Boston men reported a persistence on the part of some shippers in the practice of erroneously labeling their shipments with such statements as "No inspection required--greenhouse-grown only" in the case of woody plants restricted under the gypsy moth quarantine, as well as cable reels bearing the labeling "No inspection necessary--at all times inside of building."

Survey for Egyptian alfalfa weevil.--Field activities relating to the new species of alfalfa weevil in Yuma County, Ariz., were begun in December with 4 inspectors, the force to be increased early in the spring, when it is expected that larvae will be abundant. The inspectors are working closely with a biologist of the Division of Cereal and Forage Insect Investigations, in order to learn all they can concerning the life history and habits of the weevil. During the survey specimens will be sent to the Yuma office, where a taxonomist will make the identifications. The work is being handled as a separate project under the supervision of H. T. Rainwater, formerly on grasshopper work. An office has been established at Yuma, in the First National Bank Building.

CONTROL INVESTIGATIONS

Pyrethrin in areosol form effective against adult mosquitoes.--W. N. Sullivan, E. R. McGovran, and J. H. Fales, of this Division, in cooperation with L. D. Goodhue, of the Division of Insecticide Investigations, report interesting results from a study of the effectiveness of the pyrethrins in areosol form against the adult mosquito (Culex sp.). In preliminary tests, about 500 adult mosquitoes from 2 to 3 days old were placed in wire-screened cages within a 1,100-cubic foot room and subjected for 10 minutes to the smoke or fog produced by spraying an alcoholic solution of the pyrethrins on a hot plate (temperature 375° C.). For this work 20 cc. of solution containing 5 mg. of pyrethrins per cc. of ethyl alcohol was used. Carbondioxide pressure was used in the atomization to reduce possibility of fire hazard and to prevent the formation of aldehydes. All mosquitoes subjected to this treatment were "knocked-down" within a 5-minute period and none again attained normalcy. In 48 hours after treatment 99 percent of the treated mosquitoes were dead. The untreated check showed a mortality of 1 percent over the same period. In many respects the pyrethrins in areosol form have excellent properties for use in prevention of the conveyance with aircraft of living tropical mosquitoes and possible transmission of yellow fever to susceptible but uninfected areas. However, since only Culex sp. was used in this test and a 10-percent sugar solution was the only food supplied the adults, it is felt this test should be repeated, using blood-fed mosquitoes of Aedes and Anopheles sp. before any definite conclusions are drawn as to the effectiveness of this material in this work.

INSECTICIDE INVESTIGATIONS

Chemical studies of devil's-shoestrings.--The occurrence of rotenone in the roots of *Tephrosia virginiana*, commonly known as the devil's-shoestrings, which is the most abundant species of *Tephrosia* indigenous to the United States, has stimulated interest in this insecticide-bearing plant. Except for the original work by E. P. Clark of this Division, which first revealed the presence of rotenone, little chemical work on the constituents of the root of this plant has been reported. L. D. Goodhue and H. L. Haller have been engaged on this problem recently, and will soon issue a paper describing their findings. They worked on freshly harvested and dried roots from plants selected from breeding experiments designed to increase the insecticidal value. The roots contained 7.4 percent of materials soluble in chloroform, of which about one-third proved to be rotenone. From the resinous portion of the extract, inactive deguelin was obtained, and finally there was also obtained an oil containing sesquiterpenes and glycerides. The forthcoming paper will give details concerning the various fractions into which the original extractives were divided.

Nornicotine found as predominating alkaloid in tobacco.--It has recently been found by L. N. Markwood that nornicotine occurs as a large part of the total alkaloid in a certain strain of *Nicotiana tabacum*, ordinary tobacco. This alkaloid, which is closely related to nicotine chemically and in biological action, has been found in other species of *Nicotiana*, and was previously known to occur also in *N. tabacum* in small amounts. The present finding, however, reveals that about 95 percent of the total alkaloid of this particular strain is nornicotine. Nornicotine at present is scarce, but efforts will be made to prepare a supply of it for insecticidal tests.

Analysis of commercial dihydrorotenone.--Dihydrorotenone is the only derivative of rotenone that retains the high insecticidal action of the parent compound. It is more stable than rotenone toward oxidation in the presence of light and, mainly because of this advantage, it is being produced commercially. On a commercial scale the catalytic hydrogenation of rotenone does not always proceed to give a quantitative yield of dihydrorotenone, but instead yields a group of nontoxic compounds comprising rotenonic acid, dihydrorotenonic acid, and dihydrorotenol. The amount of dihydrorotenone obtained is now being judged by the insecticidal effect as determined by the Peet-Grady method using houseflies. Messrs. Goodhue and Haller have examined the physical and chemical properties of dihydrorotenone and the other materials mentioned with the object of finding an easy method of determining the dihydrorotenone in the mixtures. They find that the Goodhue red-color test is given only by the desired compound, dihydrorotenone, and not by the other undesirable ones. This colorimetric method is therefore suggested as a means of determining dihydrorotenone in order to obviate the necessity of resorting to the more tedious biological test.

BEE CULTURE

Resistance of bees to American foulbrood probably not physiological.--A. W. Woodrow, of the Intermountain States Bee Culture Laboratory at Laramie, Wyo., reports that the brood from resistant and nonresistant colonies, used in the studies on resistance of bees to American foulbrood, became about equally infected when reared in heavily diseased colonies which provided a uniform heavy inoculation. There was no evidence of physiological resistance in the brood of any colony. Variations in the proportion of brood infected were closely related, however, to the age of the brood at the time it was first exposed to infection. The highest proportion of infection observed was 76.9 percent on one side of one comb. As the infectious material must be supplied the first day of larval life (see News Letter v. VI, No. 11, p. 31, Nov. 1, 1939), when the brood is being fed only larval food from the pharyngeal glands of the nurse bees, it appears unlikely that the larvae become infected through the feeding of infectious honey or pollen, except perhaps accidentally. It appears more likely that the disease organisms are introduced to the young larvae from the mouth parts of the nurse bees. If this is the case, the escape of a large proportion of the brood from infection is a result both of the short time it is open to infection and of the type of feeding at that time, rather than of physiological resistance.

Vapor pressure of sugar solutions varies with concentration.--Geo. H. Vansell, Davis, Calif., reports, in connection with his work on nectar secretion, the unexpected finding that "solutions below a certain level of concentration lost moisture, while those of greater concentration gained moisture. A series of sugar solutions obtained by diluting honey with distilled water were exposed in a humidifier at about 20° to 25° C. for 114 hours. Distilled water covered the bottom of the sealed humidifier and sheets of blotting paper hung into the water as wicks. The air was assumed to be saturated. The respective original and final concentrations were 38.0, 22.5, and 12.3, and 34.3, 22.9, and 14.9 percents. The two lesser concentrated solutions lost water, indicating that their vapor pressures might be higher than that of distilled water. The concentration in two drops of poinsettia nectar in this same time changed from 31- to 25-percent sugar. All samples were exposed in watch glasses floating on the water."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Classification of male ants.--Male ants are often received for determination, but it is usually very difficult or impossible to identify them because the classification of ants is based primarily on the wholly different worker caste. Some fundamental taxonomic work on the males has been badly needed, and M. R. Smith has undertaken such a study in the hope of developing a generic classification of the males. This study is greatly hindered, however, by the lack of male specimens that can be positively identified through association with workers taken from the same colonies. It is hoped, therefore, that where such association can be definitely established in the field and specimens of the males and workers can be collected conveniently, these will be submitted to the Division of Insect Identification, preferably in alcohol, in order to further Mr. Smith's study.

High parasitization of certain leafhoppers.--Specimens of empoascan leafhoppers used in experiments in transmission of peach mosaic disease at Brownwood, Tex., and submitted for determination by L. S. Jones, proved to be of especial interest because of the high percentage of parasitization by a species of Dryinidae. The leafhopper material consists of 708 specimens used in 20 tests. The percentage of parasitization for the entire lot is 56.2, although material used in certain tests showed as high as 84 percent.

Change of names in the Homoptera.--For a number of years there has been a conspicuous lack of uniformity in the choice of names for certain groups of the sternorhynchous Homoptera. The question of the proper application disposition of the generic names *Chermes*, *Adelges*, *Psylla*, and *Psyllia* has been reviewed and the essential facts are as follows:

Chermes Linnaeus, 1758, has as its type *Chermes abietis* L.

Adelges Vallot, 1836, is monobasic, the type being *A. laricis* Vallot, 1836, which is a synonym of *Chermes abietes* L. *Adelges* Vallot, 1836, is therefore an absolute synonym of *Chermes* Linnaeus, 1758.

Psylla Geoffroy, 1762, included no named species, Geoffroy's treatment being strictly binary, not binomial. The first type designation for *Psylla* was by Latreille, 1810, who named *alni* L. the type.

Psyllia Kirkaldy, 1905, was proposed as a new name for *Psylla* of authors, not Linnaeus, with type *pyri* L. According to the present generic concept, *Psyllia* Kirkaldy, 1905, is a synonym of *Psylla* Geoffroy, 1762.

The use of "Chermidae" for the family Psyllidae appears to be based on the erroneous belief that Lamark, 1801, had designated *ficus* as the type of *Chermes*. However, the International Commission on Zoological Nomenclature has definitely stated, in Opinion 79, that Lamark's "Système des Animaux sans vertèbres" is not to be accepted as designation of type species. The proper family name for the "jumping plant lice" is Psyllidae.

The genus *Chermes* belongs in the superfamily Aphioidea, and is the type genus of the family Chermidae Fallén, 1814. As the oldest available family name, Chermidae, will take precedence over Phylloxeridae Lichtenstein, 1885, as a family designation for the plant lice now known by the latter name. Both Cherminae and Phylloxerinae will, however, be used as subfamily names for the categories now known as Adelginae and Phylloxerinae, respectively.

Unusual number of species in packing material from abroad.--Fifty-three different species of insects have been identified among material intercepted by inspectors at the New York office of the Division of Foreign Plant Quarantines in forest-litter and sphagnum packing on the S. S. *Scanpenn* which arrived from Denmark on January 11. All specimens were alive when collected. Following is a record of the number of families in the various insect orders that were represented, with an indication of the number of species in each: Coleoptera, 10 families, 29 species; Lepidoptera (larvae), 4 families, 4 species; Orthoptera, 1 family, 1 species; Hymenoptera, 4 families, 5 species; Diptera (larvae), 2 families, 4 species; Homoptera, 2 families, 2 species; Heteroptera, 6 families, 8 species.

Addition to collection of coleopterous larvae.--A valuable sending of reared coleopterous larvae has been received from J. P. Kryger, Gentofte, Denmark. Of the 64 species which he sent, 16 are new to the larval collection.

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FOR FEBRUARY 1940

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FRUIT INSECT INVESTIGATIONS

Moderate heat lethal to Cryptophagus sp.--Evidence that larvae and adults of Cryptophagus sp. are common in stored raisins during February, March, and April, but scarce or absent during the hot months, led to a test of the tolerance of full-grown larvae to a constant temperature of 84° F. George H. Kaloostian, of the Fresno, Calif., laboratory, exposed 6 lots, each of 20 full-grown larvae, to this temperature. The tests began on several dates during the first half of December 1939. The insects were in several types of containers. None were able to transform and all were dead after 5 to 18 days. Control lots kept at room temperatures of 50° to 84° for 50 to 56 days transformed to the extent of 0, 20, 35, and 90 percent, depending, apparently, on moisture conditions and on the presence of soil in which to pupate. During cool weather this unidentified species can be reared in abundance on a puppy-meal mixture (see News Letter, v. VI, No. 10, p. 3. Oct. 1, 1939), placed on soil and kept moist enough to promote a good growth of mold.

MEXICAN FRUITFLY CONTROL

No fruitfly larvae found in February.--No larval infestations were discovered during February in the Rio Grande Valley. This is the first time since 1936 that larval infestations have not been found in February. Usually, about 20 infested properties are located during this month, but the number of flies present in the groves this season appears to be below normal and the development of eggs somewhat retarded. From past experience, however, it is expected that infestations will be found early in March. The harvesting of freeze-damaged fruit was further complicated by windstorms on February 16, 17, and 18. The wind, which developed into a severe duststorm, reached a velocity of 45 miles per hour and caused an unusually large amount of fruit to fall. Certification of fruit for shipment in February amounted to 4,953 equivalent carlots. The total of shipments for the season was 21,290.9 carlots at the close of February.

JAPANESE BEETLE CONTROL

Weather interferes with plant shipments.--Although certification activities picked up somewhat during February, shippers for the most part were waiting for a break in the weather that would permit them to start filling orders already booked. The usual seasonal increase was delayed because of freezing temperatures and heavy snows during the month. Frost was still in the ground at the end of the month, with reports of frost from 12 to 24 inches deep in many sections of the Japanese beetle regulated area. Dahlia shippers were fairly active in sending out clumps to other growers for propagating purposes. Long Island dahlia shippers made many shipments to the South, and a few to California and other Western States. In the Long Island growing district, 48,000 roots, valued at $2,300, were certified during the month in conformity with State corn borer regulations. In New Jersey certifications increased 68 percent over those in February 1939 and 32 percent over January of this year. Weather conditions undesirable for extensive shipping worked to the advantage of the inspectors in the Salisbury, Md., area, as the available personnel there was barely able to handle the inspection and certification incident to the 950,000 plants shipped to points outside the regulated zone and to classified dealers within the area. A large grower in the Philadelphia area has 300,000 certified plants in storage for shipment waiting for the first warm spell. The cold weather is also reported as having retarded for about 2 weeks the emergence of adult Japanese beetles in run-hot greenhouses in the Philadelphia suburban district. A few adults were collected but no evidence of leaf feeding was observed. On February 20 a solitary live beetle was found on a lily blossom in an uncertified greenhouse on Staten Island. Root diggers in western Pennsylvania, who are usually active late in February gathering horseradish and other roots, were unable to ply their trade, as the lowlands were frozen.

Nurseries install preheating rooms for stock to be fumigated.--In order to meet the present requirements for a temperature of 65° F. before plants are fumigated with methyl bromide, a large New Jersey nurseryman is building a preheating room adjacent to a new 1,500-cubic-foot fumigation box. The plants will be kept in the preheating room until the insides of the soil balls reach the required temperature. A Connecticut nurseryman has begun the construction of a large chamber for the fumigation of evergreens. This chamber will be approximately 28 by 8 by 7 feet, with a 6-inch insulation of sawdust in the walls. It is being built at one end of his packing shed, with doors in the center of the chamber, one leading in from the packing shed and the opposite door opening outdoors. A heating unit is being installed with coils in the packing shed to preheat the plants before loading in the chamber. This will permit preheating of enough plants to permit continuous operation of the chamber if desired. After fumigation the plants will be taken directly outside. The total number of plants fumigated with methyl bromide at the end of the first year of its use is approximately 660,000. This is about 2 percent of the grand total of 33,000,000 plants shipped under certification from infested premises after some form of chemical treatment, or after they were made soil-free.

Grower may transfer southern plantings to Maryland nursery.--A grower in Maryland, who has extensive plantings both in Maryland and in one of the Southern States, is considering transferring all his stock to the Maryland location. This transfer is under consideration because of the grower's success in fumigating his plants in his large methyl bromide chamber. To date he has not lost a plant, nor has he had any complaints from customers. Checks have been made on treated stock sold to other growers for Easter forcing and thus far all treated plants are showing large buds and the plants themselves are far more vigorous looking than unfumigated stock. This shipper and another nursery in the same area required the services of an inspector daily during the month. There were 14,590 plants and 22,300 rooted cuttings shipped from these 2 establishments. The second nursery has contracted with one of the national 5- and 10-cent chains to supply 50,000 certified 3-inch gardenia plants for next season. Approximately 68,000 of this size gardenias were certified for this establishment during 1939.

Public conference to consider the Japanese beetle quarantine.--There was a large attendance of nursery-association representatives, State plant-pest officials, and other interested individuals at the public conference in the National Museum on February 27, to consider the present status of the Japanese beetle quarantine. This was the first public meeting to consider this quarantine since the hearing held on November 16, 1935. A unanimity of opinion was expressed for retention of the quarantine and continuance of its enforcement as a Federal project. Members of the Division at the hearing were E. G. Brewer, William Middleton, C. W. Stockwell, and R. W. Sherman. Copies of the report read at the hearing and supplemental data relating to 1939 trapping results, road-patrol activities, and Federal-State appropriations are avilable upon request to Bureau headquarters or to the divisional leader.

Extra revenue from methyl bromide fumigation chambers.--A grower in central Pennsylvania, who has built an approved fumigation chamber, is helping to pay for its construction by fumigating rugs, furniture, and other household articles for moths, and expects to build up an extensive side line in fumigation. Customers must bring and take away all articles fumigated, as the grower does not want to upset his regular greenhouse routine. A report from the district inspector in Ohio stated that a number of greenhousemen whose premises are uninfested with the Japanese beetle, and who are not obliged to fumigate or chemically treat their plants as a requirement for certification, are nevertheless planning to build fumigation chambers. These will be used exclusively for the control of general greenhouse pests wholly apart from any quarantine requirements.

Recommended greenhouse procedure fits in with certification requirements.--For a number of years the Ohio Agricultural Experiment Station has advocated steam sterilization of potting soil and manure used in greenhouses. Most of the greenhouses in the section of the State under regulation for the Japanese beetle are equipped for steam sterilization and therefore are in a position to meet one of the requirements for maintaining certified greenhouses under the quarantine regulations.

Trees dug by air hammer.--A classified nurseryman on Long Island, when called upon to dig and transport to Connecticut a consignment of 6 oak trees with 8-foot soil balls, met the situation by using air drills to cut out the soil balls. The order required that the trees be dug while the soil balls were frozen, so that there would be no injury to the property on which they were replanted. The trees weighed about 3 tons each.

Certification of experimental material.--At Bartlett, N. H., the Northeastern Forest Experiment Station presented for gypsy moth inspection and certification two pieces of birchwood taken from a tree infested with the bronze birch borer. The wood was consigned to the Forest Products Laboratory at Madison, Wis., for study and experimental purposes, Numerous inspections and certifications under the Japanese beetle quarantine were made during the month of soil-free material at the U. S. Plant Introduction Gardens, Glenn Dale, Md. This establishment has started their spring shipments of plants to Southern States and to California and Texas. These shipments consisted of greenhouse plants and material from the nursery, which had been inspected last fall and placed in a certified cellar for winter storage. Shipments from this establishment will be made to almost every State in the Union before the end of April.

Inspect sportsmen's exhibit material for gypsy moth.--Thirty of the 120 exhibits that were on display at the Sportsmen's Show in Boston from February 4 to February 10 were inspected for gypsy moth infestation before they were moved to the New York Sportsmen's Show. Most of the products inspected were used in the woodland scenes set up by the States of Maine, New Hampshire, and Vermont. The material was moved to New York City via freight, express, and truck. One of the freight shipments was a complete dogsled outfit from central New Hampshire, consisting of 14 dog cages, 3 houses, 6 platforms, 16 cedar frames, 3 logs, 4 spruce trees, 8 posts, and 5 stumps. A gypsy moth egg cluster was found on 1 of the stumps. Eight gypsy moth egg clusters were found in the course of the inspection of 32 stumps, examined along with trees, slabs, pine needles, old sticks, stones, pine fencing, and pine benches, as part of an elaborate woodland exhibit. Some of the New England exhibitors had their material inspected at the point of origin before shipment to Boston and they were able to retain in the express cars sufficient inspected material for the New York show and leave the material used at the Boston show to be destroyed.

Gypsy moth infestations found among inspected forest products.--During February, 16 shipments of various types of forest products were found infested with gypsy moth egg clusters, a total of 98 clusters having been removed in the course of inspection. The most heavily infested shipment inspected was a carload of lumber examined at Bow, N. H., for shipment to Elizabethtown, N. J. Two carloads of lumber inspected at Conway, N. H., for shipment to Rochester, N. Y., yielded 18 and 10 egg masses, respectively. Lumber, birch logs, poles, and exhibit material were among the items found infested.

Diseased elm found in Ridgefield, Conn., swamp.--Laboratory culturing late in February confirmed the presence of the Dutch elm disease fungus in a 35-inch d.b.h. elm in Great Swamp, near Ridgefield, Fairfield County, Conn. Certain sections of this swamp have large numbers of devitalized elms still standing. Each year only the worst elms have been removed. This year, with diseased elms on all sides of the swamp, more thorough scouting and sanitation work was performed. The confirmed tree is about 3/4 mile north along the river from a confirmed tree located in the summer of 1939. It is about 100 feet tall, possibly 40 percent dead, and was sampled during the 1939 foliar season without finding sufficient discoloration beneath the bark to warrant submitting samples for culture.

The yellow chalk mark left by the scouts was still visible when the tree was removed. An examination after the tree had been felled showed that streaking was present throughout the trunk and large leaders but did not occur in any of the living parts of the smaller branches. One dead limb was infested with *Scolytus multistriatus* Marsh., but no emergence holes could be found. Some beetles may have emerged from a part of this limb that had fallen to the ground, but there were no emergence holes in the bark from the fallen limb. Finding of this diseased tree will necessitate considerable change in the work plans for this area. More thorough sanitation measures than heretofore practiced on clear-cutting of the entire swamp are anticipated.

Elm-sanitation crews given health examinations.--Seventy men, comprising elm-sanitation crews from Bergen, Morris, Passaic, and Sussex Counties, N. J., were transported to the Newark Watershed headquarters at Charlottburg, where watershed physicians and bacteriologists tested the men to determine whether or not they should be allowed to work on the watershed property. The Newark Watershed Commission required that everyone working on the shed be a noncarrier of typhoid fever, have no lung condition, and be free from certain other diseases that may be transmitted through the water supply.

Trunk sampling discloses first-record infection.--Isolation of *Ceratostomella ulmi* from samples taken from the trunks of two elms on Newbold Island, in the Delaware River about 5 miles south of Trenton, in Mansfield Township, Burlington County, N. J., was reported by the laboratory in mid-February. The two trees are located in a swampy section of the island, affected by tidewater, and are approximately 1,000 feet apart in a heavy elm concentration. These samples were collected on January 23 by a crew assigned to special winter scouting. These are the first confirmations in this township and will add several square miles to the infected zone and the work area.

FOREST INSECT INVESTIGATIONS

Fungus associated with Cylindrocopturus injury in pine reproduction.--C. B. Eaton, Berkeley, Calif., reports that investigations made by C. T. Rumbold, of the Bureau of Plant Industry, on material sent in from Big Springs Plantation, Lassen National Forest, have disclosed the presence of the fungus *Hormiscium gelatinosum* Hedgc. (Syn. *Pullularia pullulans* (de By.) Berk.), with all active stages of the weevil and its work. The fungus was recovered in a high percentage of cases from larval galleries in the phloem and wood, and also from the feeding punctures made by the adults in pine needles. It appears to be almost universally associated with *Cylindrocopturus* damage in pine reproduction in the Hat Creek area. This fungus is a vigorous wood stainer which is of economic importance in the lumber industry. Its pathogenicity to young pine seedlings, independent of the insect, has not yet been demonstrated.

Dendroctonus valens unable to kill ponderosa pine poles retained as crop trees.--Mr. Eaton also reports that investigations on the Fandango Logging Chance, Modoc National Forest, have shown that thinning stands of ponderosa pine and white fir poles in favor of the pine resulted in numerous but unsuccessful attacks of the red turpentine beetle (*D. valens* Lec.) on the remaining trees during the first year after cutting. Nearly 15 percent of 240 ponderosa pine poles, which were released to varying degrees by cutting out the competing trees, were attacked, but the beetle was not successful in causing death of a single one. Analysis of the data obtained in this study shows that the incidence of attack was nearly 8 times higher where 1 of twin or multiple pine stems was retained than where only single stems were involved.

Vigor of host material influences density of mountain pine beetle attack.--In a report on the relationship between infestations of the mountain pine beetle and types of host material, W. D. Bedard, of the forest-insect laboratory at Coeur d'Alene, Idaho, states that tree vigor is one of the most important factors governing the density of attack. This variation in tree vigor materially influences the number of attacks per square foot, because in normal trees there may be as many as 36 attacks per square foot--5.2 for trees of reduced growth, 2.7 for root-diseased trees, and 2.1 in wind-thrown trees. This difference in the density of attack plays an important part in determining the importance of an infestation, as an increase or decrease in the number of attacked trees can result from a change in the type of material being attacked without any change in total beetle population.

Control of Pineus pinifoliae on white pine.--J. C. Evenden, Coeur d'Alene, states that plans are being made to test the possibility of reducing or eliminating damage to white pine plantations by Pineus pinifoliae Fitch. This project will be located in a white pine plantation within the Pilgrim Creek drainage of the Cabinet National Forest. During the first season a number of small plots will be treated with various sprays in order to arrive at a satisfactory method of control. This work is being instituted in cooperation with the Forest Service, with C. C. C. enrollees being used as laborers.

A new sawfly on pine.--C. L. Griswold, of the Morristown, N. J., laboratory, reports that another sawfly has been found to feed on pine. On July 8, 1938, H. A. Fiedler, of the New York State Conservation Department, found two sawfly larvae on the new growth of red pine at Suffern, N. Y. These were sent to the Morristown laboratory for identification. It was not possible to determine the larvae. One was preserved and the other placed in a rearing container with red pine foliage. It fed for a few days and then entered the soil. A female adult issued on May 23, 1939. This specimen has been determined by Grace A. Sandhouse as Acantholyda pini Rohwer. Miss Sandhouse states that the National Collection contained only the type (female) of the species and a doubtfully associated male.

Parasitization of oriental hag moth cocoons higher in heavy than in light infestations.--According to P. B. Dowden, New Haven, Conn., the Oriental hag moth (Cnidocampa flavescens Walk.) infestation in the vicinity of Boston, Mass., has increased rapidly in the last few years, particularly north of the city at Cambridge, Medford, and Somerville. A total of 1,160 hibernating cocoons were collected in the spring of 1939 at 13 out of 17 observation plots established several years ago. Parasitization by the introduced tachinid Chaetexorista javana B. & B., ranged from 1 to 49 percent. In general, the heavier infestations showed higher parasitization than did the lighter infestations. In addition, 2,789 cocoons from 31 collections made near Boston by F. W. Marshall, of the Massachusetts Conservation Department, were dissected. Parasitization of this material ranged from 3 to 32 percent, the heavier infestations again showing the higher parasitization.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Weather responsible for much loss of time on gypsy moth work.--Gypsy moth working conditions were markedly unfavorable during most of February in the larger part of the area where control methods are in progress. An ice storm in the Berkshire area of Massachusetts during the first week left the tree growth on high elevations heavily coated with ice, and ice- and snow-packed roadbeds, both in this area and in the greater part of Vermont, made travel by automobile slow and difficult. A severe snowstorm, accompanied by high wind, started late on February 13, covering the area from the Massachusetts-Vermont border south into Pennsylvania. The snowfall continued unabated until the morning of February 15 and the wind, blowing at gale force, persisted for fully 24 hours after the weather had cleared. The blanket of snow, ranging from 10 to 18 inches deep, was piled into drifts up to 15 feet or more in depth.

Gypsy moth work in Vermont not seriously handicapped.--Up to the middle of February, 8 gypsy moth infestations had been located in Middlebury, Addison County, Vt.. At the largest colony, where work is still incomplete, 57 new gypsy moth egg clusters were found and creosoted. The other infestations ranged in size from 1 to 30 egg clusters, most of them being small. At these infestations, as well as at other infested areas in Vermont, intensive gypsy moth work was temporarily discontinued the latter part of February, as deep snow had covered ground litter, rocks, butts of trees, and low growth and prevented a thorough examination of this material for egg clusters. However, scouting work in general progressed satisfactorily on days when the weather conditions permitted, although the snow-blocked roads forced the men to walk longer distances from the points that could be reached by truck to the areas where their work was to be done.

Scouting continued to prevent future wind spread of gypsy moth caterpillars.--Several crews continued to confine their scouting to the high and exposed elevations, when conditions were favorable, in the townships bordering the barrier zone, in the Berkshire region of Massachusetts, on the east, in order to locate and creosote a maximum number of gypsy moth egg clusters before hatching time. This work will reduce the numbers of newly hatched caterpillars that might be spread into the barrier zone by the wind.

Woodlots examined for gypsy moth before logging starts.--Gypsy moth field supervisors in Massachusetts have reported that numerous small logging operations were under way in various localities in Berkshire County. Most of the operators were limiting their cutting to certain species of trees, such as paper birch to be used in the manufacture of spools, white ash for rake handles, and other trees for specialties manufactured in that region. In most instances the top wood was to be sold for fuel. The wood lots where the cutting was in progress or was about to start were carefully examined so that any existing gypsy moth egg clusters could be creosoted before they had been disturbed, and also before they could be transported into uninfested areas on logs or rough lumber.

- Treatment work modified because of heavy snowfall.--Treatment work at gypsy moth infestations in Massachusetts and Connecticut, which had been in progress for some time, was necessarily modified during the latter part of February because of the heavy snowfall in those States. The burning of previously assembled brush and trash wood could not be continued, as the brush piles were deeply buried under the snow. The removal of bushes, vines, and other low growth was also temporarily discontinued, as the digging away of the snow to permit cutting close to the ground would entail much loss of time. Cutting work was restricted to the removal of the larger dead and defective trees during this period.

New gypsy moth infestation found near previously infested location.--Another infested spot was located about ¼ mile from the original gypsy moth infestation in Southbury, New Haven County, Conn., where much intensive work has been in progress since early in the winter. So far as has been determined, the new location centered around a large white oak tree, on which all except one of the egg clusters found were completely hidden under the shaggy bark.

New gypsy moth infestations found in Pennsylvania quarantined area.--During the latter part of February additional gypsy moth infestations were discovered in the townships of Scranton and Clifton, both of which are located within the quarantined area of Pennsylvania, in Lackawanna County. Treatment work at these infestations will be deferred until the snow melts, permitting the examination of dead wood and debris for egg clusters, and other exterminative work.

Storage facilities increased in Pennsylvania.--Alterations started some time ago on two of the temporary buildings at the gypsy moth storage plant in Moosic, near Pittston, Pa., have been virtually completed and the buildings will be ready for use as soon as the earthen floors are graded. The space thus made available for the storage of large trucks and bulky equipment is urgently needed and will be put into use immediately. A spraying machine, filled with water and with several lengths of hose attached, is kept in a heated storage building nearby ready for instant operation in case of fire.

Report of C. C. C. gypsy moth work for first half of fiscal year 1940.--The quarterly report of the C. C. C. gypsy moth work east of the barrier zone under the direction of this Bureau for the period from October 2 to December 30, 1939, shows a considerable increase in the number of man-days used in gypsy moth work over the number available during the first quarter of the fiscal year. About 10,000 6-hour man-days were used on gypsy moth work during the first quarter, whereas approximately 15,000 man-days were available during the second quarter. The C. C. C. gypsy moth work for the first half of the fiscal year was done on approximately 22,000 acres, and woodland thinning to reduce the percentage of favored food plants was done on slightly more than 720 acres. This has resulted in the destruction by creosoting and burning of more than 312,000 new gypsy moth egg clusters. In Connecticut the C. C. C. enrollees were employed on gypsy moth cleaning and thinning work during the larger part of the first half of the fiscal year, but early in February they began to do rapid scouting to discover pockets of severe infestation which should be sprayed during the coming summer. This work has disclosed a large spread of the gypsy moth in the area just east of the barrier zone in Connecticut, but no exceptionally heavy pockets of infestation, such as were present last summer, had been located by the end of February. Scouting by a State crew in Connecticut during a large part of the first half of this fiscal year has shown some spread of the gypsy moth in the towns of Colebrook and Harwinton, which border the barrier zone in the northern part of the State.

C. C. C. gypsy moth work reduced in February.--While approximately 2,600 6-hour man-days were used on gypsy moth work by C. C. C. enrollees during the week ended February 3, this amount was gradually reduced until only 1,000 man-days were used toward the end of the month. Heavy falls of snow on several occasions during this period contributed to the reduction by blocking the roads so that it was impossible for the men to travel to their work, and the men were used on snow-removal work around the camps. In addition to this, many enrollees who had been returned to gypsy moth work early in the month were reassigned for burning brush in connection with work in forest-fire-hazard reduction, and 2 crews of approximately 20 men each were removed from the supervision of this Bureau and assigned to do silvicultural work under the direction of the State forester of Connecticut in a lightly infested section between the Connecticut River and the barrier zone, in the southern part of the State.

Proposed C. C. C. gypsy moth spraying to be done cooperatively.--Spraying of dangerous gypsy moth infestations with arsenate of lead in Massachusetts and Connecticut east of the barrier zone will be done through the cooperation of the C. C. C., the Federal Bureau of Entomology and Plant Quarantine, and the States concerned. State officials in Massachusetts and Connecticut have requested the C. C. C. to purchase three spraying machines with a working capacity of 1,000 pounds, and, if delivery of the new equipment is delayed, Federal machines will be loaned by the Bureau for the spraying work. In Massachusetts the proper C. C. C. official has agreed to ask for the purchase of 5 tons of lead arsenate and 6 barrels of fish oil, and to increase this order if sufficient funds are available; whereas in Connecticut the State Forester will ask the C. C. C. to purchase 25 tons of lead arsenate and 26 barrels of fish oil. The State gypsy moth department of Connecticut has agreed to furnish a part of the State force to assist the C. C. C. in the spraying work. The State is also using one of the State crews to do rapid scouting work in an area between the Connecticut River and the barrier zone in the northern part of the State, to determine the areas where spraying should be done in sections east and south of the area that can be reached for scouting by the C. C. C. This crew is also engaged in locating two plots in this area that would serve for demonstrational spraying by autogiro. The force of the Connecticut State entomologist will locate a field that can be used as a landing station for autogiros.

PLANT DISEASE CONTROL

Barberry-infested areas reinspected in Iowa.--In 1939 barberry bushes were found on 189, or approximately 30 percent, of the 620 old properties reinspected in Iowa. Normally this is between 15 and 20 percent. The higher figure for 1939 is accounted for by the fact that resurveys were made in 8 of the larger areas of infestation in this State, 6 of which had not been given attention since 1932. D. R. Shepherd, in charge of control work in Iowa, comments as follows upon resurveys made last year: "It was found that the length of intervals between surveys can best be determined by checking the area to see the extent of regeneration and the size of the bushes, rather than to schedule resurveys at intervals of a certain number of years. The fruiting bushes found this year were mostly 5 or 6 years old and for that reason were missed as small bushes on the previous survey. The time of year of the previous survey and the nature of the area determined to some extent the number of bushes missed on the previous survey, and thus the number of large bushes that were found this time. In other words, fewer bushes would have been missed in some of the areas if they had been worked at a time of year when there was less foliage on the underbrush and when there were fewer weeds." According to Mr. Shepherd, it was noticeable that most of the bushes found in counties where no work had been done since 1932 were from 12 to 30 inches in height. There were few large bushes and only a negligible number of seedlings, indicating that most of the seed in the ground had germinated and that little regeneration would be expected in the future.

State W. P. A. projects approved for two States.--In Colorado a supplementary W. P. A. (State) project has recently been approved for barberry eradication in 5 counties--3 in the San Juan Basin and 2 in the San Luis Valley. Work was undertaken on January 29. In Minnesota a supplement to a State W. P. A. project, that has been in operation in Minnesota since January 1939, was recently approved. L. W. Melander, in charge of control work in Minnesota, reports that the procedure followed in connection with the State project was almost identical with that applicable in the case of Federal Agency projects. The only difference was in the mobility of crews. A Federal Agency project in Minnesota operates on the basis of 10-man units transported in small trucks. The State project crews are hauled to and from work in 1½-ton trucks and 20 men are considered a unit. Areas selected for survey with State crews, however, permitted effective use of the larger units. During 1939 survey work under the State project was conducted in Carver, Le Sueur, Olmsted, Rice, Scott, Sherburne, Winona, and Wright Counties. More than 450 barberry bushes were found on 54 different properties.

Blister rust control on national forests in North Central Region.--In 1939 initial protection was given to 5,375 acres of native pine, 6,639 acres of planted pine, and 360 acres of white pine planting sites within the boundaries of the 8 National forests of Minnesota, Michigan, and Wisconsin. In this work 9,661 man-days were spent in the removal of 1,246,136 Ribes from 33,537 acres of control area (white pine plus protective zones). To date, 47,011 acres, or 53.6 percent, of native pine, and 42,570 acres, or 92.4 percent, of the planted white pine have been initially protected within these national forests. There are also 2,966 acres of planting sites protected, to which white pine has been allotted. White pine plantings, in the amount of 45,887 acres, represent 11 percent of the successful reforestation program in Region 9 of the Forest Service. Cumulative totals show that up to December 31, 1939, 78,689 man-days have been expended in the initial eradication of 16,505,292 *Ribes* from 236,607 acres of control area.

Notes from blister rust field men.--District Leader F. H. Rose, of Vermont, writes that while working in the field he came in contact with a man who was producing knotty white pine lumber to be used for inside finish. He informed Mr. Rose that he was receiving $100 per thousand board feet for this material and that even knotty white pine is graded, the size and shape of the knots determining the grade. The knots most preferred are large and flaring rather than round. R. G. Pierce, in charge of blister rust control work in the Southern Appalachian States, writes that *Ribes* leaves the size of a dime were observed on February 24 on *Ribes cynosbati* at Fawley Hollow, Rockingham County, Va. State Leader Oscar J. Dowd, of Ohio, writes that the Soil Conservation Service there plans to furnish 323,000 white pines for spring planting, in addition to those purchased by individual cooperators. They believe white pine is the best tree for reforestation in Ohio.

Safety sling for men working in hazardous areas.--H. R. Offord writes that a heavy canvas sling has been constructed by Mr. Winslow, of the Berkeley, Calif., blister rust office, for use of men working in steep, hazardous places. Next summer *Ribes*-eradication work is expected to be undertaken inside the rim of Crater Lake, where the men will have to use ropes to work steep cliffs. A safety catch, which will prevent the supporting rope from running except at the will of the worker, will also be devised. Messrs. Offord and Winslow personally tested the sling and report that it proved to be comfortable and practical, permitting the worker to have the freedom of both hands and feet for working and for protection against bumping on rocks. Some improvements in the harness have yet to be made.

Control work in Northeast handicapped by snow.--Field operations in blister rust control work were badly handicapped by the heavy February snows. In some towns it was necessary to temporarily discontinue white pine mapping work because the trees were heavily laden with snow, and deep snow made the roads unsafe to travel. Snowshoes were required for field work in Connecticut and some of the back roads were so blocked that the crew men were unable to get near their work.

COTTON INSECT INVESTIGATIONS

Pink bollworm in lower Rio Grande Valley.--A study was undertaken in July 1939 by L. C. Fife and W. T. Hunt, with several assistants from the Division of Pink Bollworm and Thurberia Weevil Control, to determine the importance of the resting stage in maintaining the pest from one cotton crop to the next. It was found that long-cycle larvae occurred under several different environments in the field as early as the latter part of July. Examinations of open cotton bolls on the soil surface and on standing stalks in the Matamoros area of Mexico showed the presence of many resting larvae during December, January, and February. A total of 1,762 open bolls examined in January from 25 fields near Matamoros contained 14 live pink bollworms, or about 1 worm per 125 bolls. Only a few bolls remained in the fields during February, but live larvae were found following the low temperature of 25° F. at Brownsville. Nearly 10,000 bolls collected from a number of localities in Texas in January and February were also examined. Live resting larvae of the pink bollworm were found in bolls from Hebbronville, Benavides, Crestonio, and Mercedes. A rather heavy infestation occurred in the green bolls during the latter part of the season in 2 fields near Hebbronville, about 130 miles northwest of Brownsville. Eight live worms were found in 607 bolls collected in this locality in January. The most northern point at which live worms were found in February was at Benavides, in Duval County, about 160 miles northwest of Brownsville, where 1 live worm was found in 911 bolls examined. No live worms were found in the bolls examined in January and February from the Corpus Christi-Robstown-Kingsville area, where the infestation last season was lighter. More larvae have been found in bolls on standing stalks than in bolls on the ground. Examinations were made in February of 1,334 old bolls from 10 fields in the vicinity of Brownsville, which were cleaned in August 1939, or prior to the September rains, to determine whether the rains caused the resting larvae to pupate and emerge, or whether they remained in the diapause throughout the closed season. Many of these bolls were badly decomposed and a large percentage of the seeds were eaten by rats. No pink bollworm larvae were found. Old okra pods were also found to harbor larvae in the diapause. Twenty live resting larvae were found in December in examining 300 dry okra pods from stalks cut and piled in October while green. These facts show that okra and old open cotton bolls play an important part in perpetuating the pink bollworm during the closed season of cotton production. Examinations to determine the presence of pink bollworm larvae in the soil were made in September, December, January, and February. A total of 592 square yards of soil, from 3 to 6 inches in depth, were examined from the most heavily infested cottonfields. Several hibernating larvae were found in partially decomposed cotton bolls that apparently had been buried for a considerable period, but no larvae were found in free cocoons in the soil. From the examination of bolls on the stalks, it seems logical to expect a greater number of larvae in bolls on the soil surface than has been the case, and to find larvae in free cocoons in the soil. In the fields inspected most of the surface trash has been partially decomposed or a large part of the seeds eaten by rats. Also most of the larvae have been found in small, partially open bolls produced late in the season which were subjected to a more intensive infestation and to conditions more favorable for producing resting larvae. These late bolls are more likely to remain attached to the plants. The cold wave in January killed all of the growing cotton and okra and the extended dry spell has prevented new growth of these and other malvaceous plants, and has delayed the planting of a large portion of the crop. Data obtained to date indicate that larvae are overwintering only in old cotton bolls and okra pods, and in comparatively small numbers.

Calcium arsenate containing different percentages of water-soluble arsenic pentoxide for boll weevil control.--Experiments on boll weevil conducted in 1938 at several localities, with calcium arsenates containing on the average 0.5, 4.6, and 10.3 percent of water-soluble arsenic pentoxide, as determined by the New York method, were repeated at 5 localities in 1939. These calcium arsenates have been designated as low, intermediate, and high, respectively. The tests included 68 replications. The average weevil infestation during 1938 and 1939 in the plots treated with low was 18.9 percent, intermediate 17.6 percent, high 17.2 percent, and untreated checks 34.7 percent. The average yield in 1/60-acre plots treated with low was 24.1 pounds per plot, intermediate 23.2 pounds, high 23.3 pounds, and untreated checks 19.5 pounds. The differences between the infestations and the yields in the plots treated with calcium arsenate varied significantly at the 1 percent level from the infestation and yield in the untreated checks, but there were no significant differences among the infestations and yields in the plots treated with the calcium arsenates containing low, intermediate, and high percentages of water-soluble arsenic pentoxide.

Low winter temperatures and boll weevil mortality.--Many people are inquiring as to what effect the unusually low temperatures that occurred throughout the Southern States during January had on the boll weevil population. It is still too early to make definite statements on this subject. The problem is complicated by the fact that in many places the weevils were protected because the ground was covered with snow when the minimum temperatures occurred. At Tallulah, La., freezing temperatures were recorded on 20 days in succession. Beginning on January 14 and ending on February 3, the minimum temperatures in degrees Fahrenheit were recorded as follows: 32, 23, 20, 28, 20, 7, 11, 14, 18, 21, 10, 8, -5, -8, 11, 18, 27, 17, 22, 28, 30. On 5 days, from January 23 to 27, the maximum temperature did not go above 32° F. On November 4, 1939, in each of 6 screened cages (size 4 by 4 by 4 feet), containing Spanish moss, 500 weevils were released. The contents of 3 of these cages were examined during the first week of January and the percentage of weevils alive recorded as 24.9, 12.3, and 9.0 percent. In 3 other cages examined on February 1 no living weevils were found. In another cage containing surface trash, where 50 weevils had been released on December 18, no live weevils were found on February 6, when 45 dead weevils were recovered from the 50 placed in the cage on December 18. The records thus far obtained indicate that there will be a very low survival of boll weevils in the vicinity of Tallulah this spring.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Planting of the 1940 cotton crop in lower Rio Grande Valley.--A restricted planting period, between February 20 and April 1, was established by the State department of agriculture for the 1940 cotton crop in the lower Rio Grande Valley district of Texas. This step was taken in an effort to shorten the cotton-growing season and intensify the control program in that area, where infestation has steadily increased since the initial finding of the pink bollworm in the Brownsville-Matamoros area in 1936. There were only three violations of this planting regulation, and it is believed these were due to misunderstandings on the part of the farmers concerned. The total acreage involved in the violations was very small, and was destroyed by the operators immediately following the request by the State department of agriculture that this be done. General planting was begun on February 20, mostly on lands previously irrigated;

however, only a very small acreage had been planted at the close of the month, owing to cool nights and lack of rainfall throughout the entire area. The effects of the drought on the preparation of land for the 1940 crop have been more pronounced in the Mexican areas than on the American side, owing to the fact that only a few thousand acres of land in that region is subject to irrigation. Although only a small area was subject to a restricted-planting date on the Mexican side of the Rio Grande, seed dealers in that area cooperated with the pink bollworm program to the extent that they refused to deliver seed to the farmers until after February 20.

Destruction of soca cotton and random plants in south Texas regulated area and lower Rio Grande Valley of Mexico.--Following the completion of the planned 1939 stalk-destruction program in the south Texas regulated area, sprout plants continued to develop on 1939 cotton acreage. Thus, in order to maintain a host-free period until the fruiting of the 1940 cotton crop, it was necessary to go into the fields with crews of Bureau laborers and grub out these random plants. Soca cotton in abandoned fields also continued to be found throughout the area. The above situation pertained especially to the lower Rio Grande Valley area, and while all tender growth on cotton plants was killed in that section during a freeze late in January, it soon developed that these plants were rapidly reviving and that it would be necessary to continue this phase of the control work. About the first of February a recheck of the entire lower valley area was begun, and at the end of the month crews had practically completed the coverage and had grubbed scattered plants from 1,186 acres of 1939 plantings and 9,971 acres of soca cotton. Normally, in the lower Rio Grande Valley, all of the cultivated area is plowed and prepared for planting by the farmers late in January and in February. This general farming practice would thus remove practically all remaining cotton growth; however, owing to the unprecedented drought throughout the entire area, only the irrigated sections had been put into cultivation at the end of February. This condition has resulted in a large acreage, on which some unplowed stubble exists, therefore it will be necessary to maintain a sufficient number of crews through March to continue this work. The stub situation in the Matamoros area of the lower Rio Grande Valley of Mexico is about the same as on the American side; that is, on lands too dry to be prepared for planting, occasional stubs were beginning to put on growth at the close of the month, and a few plants were found bearing very small squares. In such instances, the farmers involved were being required by the Mexican Department of Agriculture to grub out the plants. In the Coastal Bend district of the south Texas area, several fields of scattered soca were found and destroyed during the period and a number of 1939 cotton fields were cleaned during the month in which material was becoming a menace. Not much cotton was found in any of the locations, and it is believed that most of the remaining plants in that area will be destroyed through the regular course of crop preparation, before they begin fruiting.

Field clean-up in the Glendale area of Arizona.--Gin-trash inspection of the 1939 cotton crop in Arizona revealed that a fairly heavy pink bollworm infestation existed in approximately six fields in the Glendale section of the Salt River Valley. As a result of this condition, field clean-up of approximately 3,000 acres of cotton land was begun early in January. Much of this acreage was extremely difficult to clean, owing to an unusual amount of material remaining in the fields. Also, for various reasons, a great deal of shattering of seed cotton and debris had occurred, making considerable hand-raking and picking necessary. Clean-up operations in this area were practically finished at the end of February and, notwithstanding the many difficulties involved, a very satisfactory program was accomplished.

Situation in the Big Bend.--Control measures, similar to those employed under the two-year plan for the 1938-39 crop season, so effective in reducing pink bollworm infestation in the Big Bend, are being carried out in the Big Bend area of Texas for the 1940 crop season. Cottonfields were cleaned in that area immediately following the harvesting of the 1939 cotton crop, and on January 29, 1940, the State commissioner of agriculture issued a proclamation making it mandatory that no cotton be planted in Presidio County prior to April 20. Also, no stub cotton will be allowed to grow in that county prior to the planting date. Farmers in that area as a whole appear very agreeable to the regulations governing the control program and it is expected they will conform 100 percent in regard to the delayed-planting date. Excellent cooperation is being received from the Mexican Department of Agriculture in carrying out similar control measures for the Ojinaga district of the Big Bend of Mexico.

Wild-cotton eradication.--An effort to eradicate wild cotton from southern Florida and adjacent keys was begun several years ago when it was found that these plants were heavily infested with the pink bollworm, from which infestation was spreading to domestic cotton plantings in the northern part of the State and in southern Georgia. Very good progress was made in the elimination of wild cotton during February. As during January, 12 W. P. A. crews, 2 Bureau crews, and a company of C. C. C. enrollees, were engaged in this work. The C. C. C. enrollees are operating in the Cape Sable area, where approximately half of the wild cotton acreage is found. During the first week of the period, 25 Bureau workers were established in a small camp located near the C. C. C. camp, and 2 W. P. A. crews were transferred from Key Largo to the Cape Sable section to assist in wild cotton eradication in that area. The first cleaning of the Cape Sable area for this season was completed at the end of February. A total of 5,778 acres was cleaned, from which 11,572 plants with mature bolls, 461,714 seedling plants, and 1,[illegible]74 sprout plants were removed. A second cleaning for the season was completed in the Key Largo and Matecumbe sections, and in the Key West, Marathon, and Fort Myers sections good progress was made toward completion of second cleanings for the season. For the entire Florida area, approximately 7,470 acres was cleaned in February and 11,803 plants with mature bolls, 4[illegible]7,959 seedlings, and 2,027 sprout plants were located and destroyed.

Thurberia-plant eradication.--The project for the destruction of Thurberia plants in the Santa Catalina and Tortillita Mountains of southern Arizona, which was begun in 1935, is now nearing completion. The removal of Thurberia plants from these 2 mountain ranges, which were at the inception of this program nearest to commercial cotton plantings, was undertaken when it was found that they were infested with a weevil that attacks domestic cotton, and that they also afforded a possible host to the pink bollworm. Following a second coverage of the Tortillita Mountains, a recheck of the Catalina Range was begun and in February 4,040 acres was covered and 29,557 Thurberia plants were located and destroyed. On this second coverage it is gratifying to find that only a very small number of plants were missed during the first clean-up.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Relative susceptibility of certain crucifers to cabbage caterpillar.--In a series of replicated field plots containing green cabbage, red cabbage, collards, cauliflower, broccoli, kale, Brussels sprouts, and kohlrabi, C. E. Smith and R. W. Brubaker, of the Baton Rouge, La., laboratory, found during the fall of 1939 that there were significant differences between the caterpillar populations supported by some of these crops. This appeared to be influenced to some extent by the size of the plants, the stage of maturity, and the duration of the crop period. The species of insects involved in these tests were the cabbage looper, the imported cabbage worm, the diamondback moth, the cabbage webworm, the cross-striped cabbage worm, and several species of Agrotinae, consisting principally of the corn ear worm and cutworms. The percentage of total caterpillar population found on each of the crops in September and October 1939, was as follows:

Cauliflower-------	18.3	Red cabbage----------	12.2
Broccoli----------	18.2	Green cabbage--------	7.3
Brussels sprouts--	16.2	Kohlrabi-------------	6.5
Collards----------	15.2	Kale-----------------	6.1

Although green cabbage was among the crops carrying the heavier populations during September and up to about October 20, the population on this crop decreased markedly thereafter in comparison to those on several of the other crops. Apparently this phenomenon was due to the maturing of the crop and possibly to the fact that the lepidopterous adults were attracted for oviposition to some of the larger sized plants in plots where the other crops included in this series of tests were growing. Data obtained in these experiments indicate that red cabbage was just as susceptible to the species of caterpillars involved as was green cabbage and actually supported a larger population. Kohlrabi supported a relatively low population, attributable apparently to its relatively small volume of foliage and the low growth of the plants and not to any dislike for the crop. Kale was apparently less desired by the caterpillars than any of the other crops, which could not be accounted for, unless it was due to the extremely crinkled foliage, which may have influenced egg deposition. Although previous field observations had indicated that the caterpillar population on cauliflower in Louisiana was ordinarily composed largely of the cabbage looper, the data obtained in these tests demonstrated that under some conditions at least, the imported cabbage worm may be considered as an important pest of cauliflower in this section.

Cube constituents are ad-absorbed by raspberry roots and translocated to leaves, canes, and fruits.--In tests performed by B. J. Landis and W. W. Baker, of the Puyallup, Wash., laboratory, in cooperation with R. A. Fulton, Columbus, Ohio, in connection with experiments on the control of *Byturus unicolor* Say, it was shown by the goldfish method of testing that the constituents of cube, applied to raspberry plants, were ad-absorbed by the roots and translocated to the leaves, canes, and fruits, when applications of the ground root were made to the soil. Quantities of toxic materials lethal to goldfish were present in raspberry canes 194 days after cube powder had been applied to the roots. No toxicity to goldfish was detected in samples of leaves and canes of plants sprayed in 1937 and 1938 and analyzed in 1939. No evidence of toxicity was detected in raspberry fruits, which had been covered with cellophane and the vines treated three times with rotenone-bearing materials. The extracts made as late as 143 days after application from raspberry canes sprayed once with cube in water caused mortality to goldfish, whereas extracts from canes protected from the application produced no mortality. Raspberry leaves collected 56 days after the last of three sprays containing cube were applied caused mortality to goldfish. No significant differences in mortality to goldfish were observed when opposed to extracts of samples of raspberry leaves that had been sprayed with cube alone or with a spray containing cube and a sulfonated alkylated diphenyl as a wetter and spreader.

Wireworm injury to potato seed pieces reduced by applying sawdust treated with dichloroethyl ether.--M. W. Stone, of the Ventura, Calif., laboratory, reports that in a preliminary experiment performed in 1939, injury to potato seed pieces by wireworms, principally the sugar beet wireworm (Limonius californicus Mann.), was reduced markedly by a sub-surface application of sawdust treated with dichloroethyl ether mixed with the fertilizer and drilled in with the seed pieces. The drill was set so that the mixture was placed at a distance of about 2 inches on either side of the seed pieces and at a depth of 4 inches, corresponding with the planting depth of the potatoes. An examination of the seed pieces on the 7th, 11th, 14th, and 17th day after planting disclosed that of 90 seed pieces examined only 4 wireworm larvae were found in the rows treated with the dichloroethyl ether mixture, as compared to 99 larvae in 90 seed pieces taken from untreated rows grown under comparable conditions. In a series of soil samples, it was found that on an average there were 0.93 living wireworm larva per ½ square foot in the treated row, as compared to an average of 4.4 wireworms in the same unit area of the untreated rows. As no dead larvae were found in the seed pieces from the untreated row, it was apparent from the general results obtained in this experiment that the designated mixture containing dichloroethyl ether was effective in either repelling or killing wireworms attacking potato seed pieces.

Flight of sweetpotato weevil adults important in spread of infestation.--K. L. Cockerham and O. T. Deen, of the Sunset, La., laboratory, report that, as a result of experiments performed during 1939, the flight capabilities of adults of Cylas formicarius (L.) have been shown to be a greater factor in the spread of infestation than had previously been observed. Trap patches of sweetpotatoes planted at various distances from the only known source of infestation showed that 44.9 percent of the plants were infested at a distance of 940 yards, 15.8 percent at a distance of 1,320 yards, and 30 percent at a distance of 1,760 yards from the point of dispersal.

Calcium arsenate, paris green, or cryolite effective against beet armyworm on lettuce.--K. B. McKinney, of the Phoenix, Ariz., laboratory, reports that experiments against Laphygma exigua (Hbn.) as a pest of lettuce in the Salt River Valley in 1939 demonstrated that this pest may be effectively and economically controlled by the application of calcium arsenate undiluted, or paris green and lime (1-6), or cryolite and clay (1-2) applied at the rate of from 15 to 20 pounds per acre, a few days before thinning the lettuce. This method of combating the beet armyworm practically eliminated the loss or injury to small lettuce plants which very often occurs immediately after the plants are thinned.

Fall populations of beet leafhopper low in San Joaquin Valley.--The results of a survey conducted by M. F. Bowen and G. T. York, of the Modesto, Calif., laboratory, disclosed that the fall population of Eutettix tenellus (Bak.) on Russian-thistle (Salsola pestifer A. Nels.) in the San Joaquin Valley of California was lower than it has been during the 6-year period 1934-39, inclusive, and approximated 6,575 millions, or approximately one-ninth of the estimated number of leafhoppers present in this same area during the corresponding period of 1938. The nearest approach to this low figure was in 1935, when the population of leafhoppers on Russian-thistle in the San Joaquin Valley was estimated as about 8,206 millions. This decrease in leafhopper population is attributed principally to the reduction in the acreage occupied by Russian-thistle this year, as compared to 1938, together with the fact that the population of the leafhopper in the two principal areas where Russian-thistle occurs was markedly lower this season than in any previous year.

INSECTS AFFECTING MAN AND ANIMALS

Control of short-nosed ox louse.--O. G. Babcock, of the Sonora, Tex., laboratory, has been working on the control of Haematopinus eurysternus Nitz., a cattle pest which has shown considerable resistance to the standard insecticides. Concerning tests with a mixture of cube, sulfur, and water used as a dip, Mr. Babcock writes as follows: "During the past year a sufficient number of cattle were dipped in the cube (containing 5% rotenone)-sulfur dip to show that this dip is practical and will kill all lice present, but not the eggs. The minimum lethal dose seems to be 2½ pounds of the cube and 50 pounds of sulfur in 1,000 gallons of water. More work is needed to determine the value of extracts of derris, as well as of cube, as compared to powdered cube in combination with sulfur. It has also been shown that a 14-day interval between dippings for the short-nosed cattle louse is not practical, as not all of the eggs will hatch in that time. A 17-day interval, and no less, is absolutely essential."

Effect of phenothiazine on milk.--Tests of the effect on milk of feeding phenothiazine to lactating cows was continued at the Dallas, Tex., laboratory. It will be recalled that this chemical has been shown to have some inhibiting effect on the breeding of the horn fly in cow manure. We quote a passage from the report of W. G. Bruce: "One animal was fed phenothiazine, in bran, at the rate of 1 gram per hundredweight twice daily. Milk samples were collected twice daily. Milk collected 24 hours after the first dose of phenothiazine and all subsequent samples had a reddish color of various intensity. Milk from another cow fed the same dose, but only once daily, showed no distinct color change; however, the samples of milk had a faint reddish tinge. The cow that was fed the fewer doses refused to consume all the medicated bran on some occasions."

Correction.--In the News Letter dated February 1, 1940 (v. VII, No. 2, p. 22), under "Field tests on natural screwworm cases," line 11, the sentence beginning, "Although slightly less effective, etc." should read, "Although diphenylene oxide proved slightly less effective than diphenylamine, this material may be a practical treatment in screwworm control because of its low cost and because of its advantage over diphenylamine in that it does not cake upon exposure to high temperatures."

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.--Two larvae and 1 pupa, all living, of the Mediterranean fruitfly (*Ceratitis capitata* Wied.), were intercepted at New York on October 23, 1939, in a box containing 4 pears and 4 apples in baggage from Germany. A living specimen of the mirid *Fulvius bisbistillatus* (Stal) was taken at San Francisco on November 27, 1939, on an orchid (*Cattleya*) in cargo from Colombia. Living specimens of the whitefly *Aleurodicus* (*Metaleurodicus*) *manni* Baker arrived at Brownsville, Tex., on November 7, 1939, on gardenias in cargo from Mexico. Living specimens of the lygaeid *Nysius minutus* Uhl. were found at El Paso, Tex., on October 10, 1939, on a leaf of mustard greens in cargo from Mexico. Living specimens of the whitefly *Aleuroplatus* (*Orchamus*) *mammaeferus* Q. & B. were intercepted at Philadelphia on October 2, 1939, on *Codiaeum* leaves in ship's quarters from Japan. A living specimen of *Lygaeus poeyi* Guer. arrived at New Orleans on November 2, 1939, on a banana fruit in cargo from Mexico. A living adult of the erotylid *Aegithus clavicornis* L. was found at Galveston, Tex., on November 6, 1939, with banana debris in cargo from Mexico. A larva of the lycaenid *Cosmolyce boeticus* (L.) was taken at Baltimore on November 25, 1939, in a green soybean pod in ship's stores from Japan. A living specimen of the mirid *Sixeonotus areolatus* Kngt. arrived at Eagle Pass, Tex., on November 22, 1939, on head lettuce in baggage from Mexico. Specimens of the coccid *Halimococcus lampas* Ckll. were intercepted at Washington, D. C., on June 20, 1939, on fruits of *Bismarckia nobilis* in the mail from France.

Bitter orange a preferred host of Mediterranean fruitfly.--Two vessels, each containing a quantity of bitter oranges from Italy for the marmalade factories in Canada, arrived in New York late in February. The fruit on both vessels was found to be infested with *Ceratitis capitata* Wied., and adults were observed crawling on the cases and on the ceilings of the compartments in which these oranges were stowed. These compartments were closed and fumigated with HCN. This fumigation included the fruit. After fumigation the fruit was permitted to move, under safeguard, by rail to Canada. Through the splendid cooperation of the Division of Plant Protection of Canada, the railway cars have been carefully swept and cleaned in Canada before being permitted to return to the United States. After the fruit had been removed, the compartments in which it had been stowed were again fumigated with a larger dosage of cyanide. This second fumigation was given for the reason that both these vessels were due to make stops at southern ports. The debris from the stowage compartments was swept together and specimens of the fruitfly were taken from it. In the debris taken from one of the ships there were 11 adults, 55 larvae, and 918 puparia, all killed. From the debris of the other vessel there were gathered 142 adults, 11 larvae, and 232 puparia, also all dead. After all the safeguards had been accomplished the vessels were allowed to clear for southern ports.

Mite on Mexican garlic.--Specimens of Mexican garlic sent in during October and November 1939 as diseased frequently showed a flabby or slightly shrunken condition of the outer fleshy scales, which had a "mealy" appearing surface. Examination with a hand lens did not reveal any organism, but microscopic examination revealed the presence of tiny mites which have been determined by H. H. Keifer, of the California State Department of Agriculture, as Eriophyes tulipae Keifer. The mites were found only on garlic which appeared to be rather newly harvested, the stems being moist and still flexible.

Bacterial names to be changed.--The Division of Mycology and Disease Survey, whose decisions as to nomenclature are closely followed in plant disease notes in the News Letter and other data issued by this Division, has decided to adopt the recommendations of the American Society of Bacteriologists with respect to the names of bacterial organisms. This means that a number of names of common organisms will be changed. A list of the changes of particular interest to this Division will be prepared and issued to the ports.

Tomato diseases from Mexico.--During the tomato-shipping season several inspectors on the Mexican border have been making a special effort to learn to distinguish the different bacterial fruit spots and the different Phytophthora rots. Both problems "stump" the specialists rather frequently, but it is believed that intensive study on the part of the inspectors, who have unusual quantities of such material to inspect and study, will enable them to become as proficient in the detection and determination of the tomato diseases as is practicable without the use of culture or other time-consuming methods. Interceptions of Bacterium punctilans Bryan (determinations made or verified by S. P. Doolittle) made at Nogales early in February were the first authentic interceptions of the "speck" disease which apparently cannot be distinguished from small lesions of bacterial spot (Bacterium vesicatorium Doidge) in many cases.

New rust in air express.--The rust mentioned in the News Letter dated March 1, 1939 (v. VI, No. 3, p. 21, line 4) has since been described by George B. Cummins in the Bulletin of the Torrey Botanical Club (67:75, 1939). It is now Uredo wakensis Cummins, intercepted at Honolulu on February 22, 1938, on Tournefortia sp. in air express, from Wake Island.

Another new species of nematode.--A species of Panagrolaimus found at New York on Nelumbium nelumbo root on November 11, 1939, in cargo from Cuba appeared to Inspector Bassen to be new. This was verified by Dr. Steiner, of the Bureau of Plant Industry, who suggested that Mr. Bassen publish the description. Data for the publication are being assembled.

A new form genus of the Moniliaceae.--That plant quarantine inspectors frequently contribute to the sum total of scientific knowledge is again demonstrated by the recent publication in Mycologia (v. XXXII, No. 1, pp. 23-30, Jan.-Feb., 1940) of a paper, "A New Form Genus of the Moniliaceae" by Donald P. Limber, of this Division. This paper is the outgrowth of studies begun when a fungus, which when examined under a hand lens appeared to belong to the form genus Verticillium, was found on the dead roots of a plant of Yucca treculeana of Cuban origin. The new genus

Tritirachium includes those members of the tribe Verticilliae in the family Moniliaceae which are distinguished by the characteristic zizag form of the fertile portion of the conidiophores which simulate the rachis of a wheat spike. The species assigned to this genus include *T. dependens* and *T. album*, which Mr. Limber described and illustrated as new, and a new combination, *T. spicatum*, a fungus previously described by Ferraris as *Sporotrichum flavicans* Fries var. *spicatum*.

A banana leaf disease.--A careful examination in February of dried banana (*Musa* sp.) leaves from Brazil, which were used as packing material in cases of wild orchids inspected at Washington, disclosed a fungus resembling *Mycosphaerella musae* (Speg.) Syd. The perithecia on the banana material were definitely smaller than those described for *M. musae*, but in all other respects it was identical with this species. Similar material taken from banana shipments has been received from various ports. Dr. Gerold Stahel, of Surinam, while studying *Cercospora musae* Zimm., found a species of *Mycosphaerella* associated with it and possibly its perfect stage. As the name "*musae*" was already in use, he proposed to call this species *M. minima*, the perithecia being exceedingly small. It seems likely that the material intercepted and having small perithecia is this form, at least in part.

A disease on Araucaria seeds.--A *Cryptospora* was found on the seeds of *Araucaria excelsa* received at Washington, D. C., from New Zealand in 1933. The fungus, *Cryptospora longispora*, has only recently been described by Servazzi who notes that his fungus was proved to be pathogenic by inoculations and was the cause of a serious disease of the plant. The fungus found at Washington seems to be identical with Servazzi's, except that the spores are slightly shorter.

DOMESTIC PLANT QUARANTINES

Crickets and 'hoppers hatching.--With the first of March, grasshoppers began to appear in large numbers in nets of inspectors conducting the Egyptian alfalfa weevil survey. Their hatching followed a short rainy period characterized by strong winds. Following the rainy period warm weather up to 80° F. in the sun prevailed. In Arizona grasshoppers were hatching at Yuma, damaging cantaloup and melon seedlings on March 4. The poison bait left over from last year's control operations was released for spreading in this area.

Grasshopper bait needs for 1940.--Nearly 118,000 tons of bait will be needed for grasshopper control in 1940, according to adjusted estimates for the 24 States. The average percentage of infestation in each county was derived by averaging survey ratings given to a representative infestation within that county. These ratings have been converted into percentages of predetermined acreages of grasshopper-susceptible crops, such ratings being based on counts of grasshoppers per square yard and egg pods per square foot in places known to be suitable for their reproduction and development. In other words, this percentage is an average of conditions applied to the total amount of bait needed for the most efficient control for a maximum infestation. After determining the average percentage of infestation, or, in other words, the percentage of crops infested, the method of estimating quantities of bait (dry) needed for control in each county has been as follows: The total crop acreage (grasshopper-susceptible crops in each county) x percentage of infestation (in decimal form) x 10 pounds of bait (dry) per acre = pounds of bait needed.

Savings under grasshopper control work over a 5-year period.--In reviewing the results of the grasshopper control work for the last 5 years, it is found that the total of the estimated savings and losses amounts to $757,501,833, or more than three quarters of 1 billion dollars. It is seen that the average annual problem for the 5 years has amounted to $151,500,366. The following represents savings per bait ton during the last 5 years: 1935, $700; 1936, $880; 1937, $1,290; 1938, $1,255; and 1939, $836. The decreased values during 1939 resulted from the baiting for protection of nearby crops of range and idle lands where savings are necessarily less than in good crop sections.

Program on white-fringed beetle control worked out.--The outline of control work on the white-fringed beetle for the current year, as worked out with the cooperating States, is based on the methods of control which have been found most effective in the last 2 years, and takes into consideration the vulnerable points of attack in the life history and habits of the beetle, as determined by research. The objectives include the early eradication of the beetle in certain isolated areas, drastic suppression of the beetle population in all other areas, and prevention of natural and artificial spread. Intensive surveys will be undertaken, it is anticipated, in and adjacent to infested areas, and along railroad rights-of-way leading therefrom, as well as at other points in the Southeastern States. The control methods include the application of herbicides and insecticides, soil treatment, and the use of fumigants, and place considerable emphasis on clean-culture practices on cultivated lands, pasture land, open range adjacent to fields, vacant lots, and garden plots. During the month of February there was considerable activity in determining acreages of crops in the infested area and in contacting farmers relative to their planting programs. The clearing of 1,200 acres of land in preparation for the control work in the coming season was accomplished by W. P. A. crews. The County A. A. A. Committee of Walton County, Fla., has worked out a benefit-payment plan whereby farmers on infested farms can leave strips in their regular crops to allow for the passage of dusting equipment, and by planting these strips to certain legumes, they will receive payment. The plan is under consideration in other counties.

Work program for sweetpotato weevil control.--The program of work proposed for the current year on the sweetpotato weevil control project, as arranged with cooperating States, provides for a resurvey of 83 counties in Alabama, Georgia, Mississippi, and Texas, and the extension of survey work into 7 additional counties in these States. Such work comprises the inspection of sweetpotato beds, fields, storage places, and wild host plants. The project will be carried along the same general lines as previously with the same objectives of (1) eradication, if possible, of the sweetpotato weevil from the commercial areas which lie north of that section along the coast where wild host plants are rather generally established and where infestations exist, and eradication in isolated areas or in other districts where such action seems feasible; (2) extending the surveys north of the known infested areas to determine the extent of infestations; and (3) to set up control areas from which host plants will be eliminated, for the protection of areas where the weevil has not been found or where eradication is undertaken. No change in methods of eradication is contemplated. Educational activities will be continued in cooperation with the county agents and agricultural teachers. Publications and quarantine notices will be distributed. Meetings will be held with growers. Motion pictures of the weevil and of the work of the project will be shown.

New findings of the Egyptian alfalfa weevil.--In February inspection for the new species of alfalfa weevil resulted in finding that infestations in the Yuma, Ariz., area were more widely extended than was previously known, having been found at 17 additional points in the Yuma Valley, extending the known infestations, thus far, 4 miles west and 8 miles south of Yuma, and to a point 1½ miles from the Mexican border. Specimens were also taken for the first time at 1 point each in the North Gila and South Gila Valleys, in Yuma County. The finding of larvae and adults in a very limited area at Tempe, Ariz., in a preliminary survey of the Salt River Valley, represented the first record of taking Hypera brunneipennis (Boh.) outside the Yuma area. In Imperial County, Calif., sweeps at 45 points resulted in finding infestations at 2 points adjacent to those of the Yuma Valley and at 1 point about 3 miles from the infestation in the North Gila Valley. Scouting in the Imperial Valley from February 26 to March 5 at 186 points where the occurrence of the pest was considered most likely, brought negative results.

Transit-inspection forces increased.--Arrangements are being made for the assignment of an inspector for the spring nursery-stock shipping season at each of the stations of Dallas, Memphis, and Birmingham, for the more effective enforcement of white-fringed beetle and cotton quarantines. The forces at Chicago, Omaha, Atlanta, and New York, are being increased by the addition of one or two inspectors at each of these stations, and such work is being resumed at Indianapolis and Detroit, with a Michigan State inspector also being assigned at the latter city. The regular force is maintained at Philadelphia, Pittsburgh, Boston, Jacksonville, and Kansas City. Through the transfer of the inspector formerly located at Springfield, Mass., transit inspection was initiated at Buffalo on February 23, an important transfer point for the concentration of west-bound shipments of mail, express, and freight from regulated areas in the Northeastern States. Of special comment on the part of the Buffalo inspector is the eagerness of all carrier employees to cooperate in the work. At Pittsburgh more time is being devoted to freight and express shipments than heretofore, as it is believed that violations found in such shipments are generally more serious than those found in the mail. The inspection tours at that point are being rearranged accordingly.

Exhibits for Sportsman's Show at New York checked.--Transit inspectors at New York report that the arrival of material for the Sportsmen's Show held at the Grand Central Palace on February 17-25 necessitated devoting considerable time to the checking of large shipments of such material as birch, oak, white pine, cedar, juniper, spruce, ornamental shrubs, logs, birch bark, and rocks. One large shipment was found uncertified and it was necessary to inspect it and oversee its complete destruction after the show closed.

Citrus canker activities.--The month of February marked the completion of the inspection of citrus trees in Houston, Tex., which resulted in finding 17 hedges of Citrus trifoliata in the city. Work was then extended to the highways on prairies extending west to the rice-growing section. Cooperative inspection was resumed in Louisiana on January 31, and 2 types of work were begun: (1) House-to-house inspection in the parishes of St. Martin, St. Landry, and Lafayette, particularly in places where canker has been found in recent years; and (2) systematic inspection along the banks of the Mississippi beginning at Vacherie, St. James Parish, and extending north and south. Work was started along Bayou Teche on the Iberia-St. Martin Parish line in the area where the French who were deported from Nova Scotia first settled in about 1755. A crew at Thibodaux, La., working properties where canker has been located in recent years, reports that some citrus trees are being found.

CONTROL INVESTIGATIONS

Mixtures of nicotine with naphthalene found promising.--H. H. Richardson and A. H. Casanges, of the Beltsville, Md., laboratory, found that the addition of low concentrations of nicotine (4 to 6 micrograms per liter) to toxic concentrations of naphthalene, increased the efficiency against the greenhouse whitefly in exposures of 15 to 75 minutes, at 77° F. The speed with which the whiteflies were paralyzed by the mixture was also increased. Changes in relative humidity seemed to have little effect on efficiency. Against the green peach aphid, the addition of small concentrations of naphthalene to toxic concentrations of nicotine did not increase the mortality of aphids, but the mixture appeared compatible. The combination of the two gases seems worth testing under practical conditions.

P-dichlorobenzene in areosol form effective against certain household insects.--W. N. Sullivan, E. R. McGovran, and J. H. Fales, of this Division, in cooperation with L. D. Goodhue, of the Division of Insecticide Investigations, and W. M. Davidson and S. C. Billings, of the Food and Drug Administration, report promising results of preliminary tests using p-dichlorobenzene in areosol form against certain household insects. In this work 40 cc. of a safrole solution containing 0.5 gram of p-dichlorobenzene per cc. of solution was sprayed on a hot plate (temperature 380° C.) within a 50-cubic-foot cabinet. After a 24-hour period of exposure the insects used in this test (see table) were held for observations in the usual manner. The results of these tests are shown in the following table.

Test No.	Material tested	Concentration	Insect tested	Insects tested	Effectiveness in 1 day	Effectiveness in 4 days
				Number	Percent	Percent
1	p-dichlorobenzene	20 g. of p-dichlorobenzene in 40 cc. solution	*Tineola bisselliella* (larvae)	30	--	100
2	do.	do.	*Periplaneta americana* (nymphs and adults)	80	--	100
3	do.	do.	*Blatta germanica* (nymphs and adults)	40	100	--
4	do.	do.	*Musca domestica* (adults)	150	100	--
5	do.	do.	*Attagenus piceus* (larvae)	40	--	95

It is of interest that clothes moth and carpet beetle larvae were effectively controlled, using about one-tenth the usual dosage of p-dichlorobenzene. The high mortality obtained against roaches indicates promise in this line of investigation.

INSECTICIDE INVESTIGATIONS

Deguelin in derris and cube.--Deguelin is recognized as being the insecticidal constituent in derris and cube which is next in importance to rotenone. L. D. Goodhue has recently published a method for its estimation. After the rotenone and alkali-soluble portion of a derris or cube extract are removed by appropriate means, the remaining resin is treated with methanolic alkali, which racemizes it and permits it to be recovered by crystallization from carbon tetrachloride in the form of a 1:1 solvate. Thirteen samples were examined; the derris samples showed from 0.24 to 3.9 percent, the cube samples from 0.25 to 2.3 percent.

A definite measure of inherent toxicity.--For some years an attempt has been made in this Division to put the study of inherent toxicity on a strictly quantitative basis, with the intention of seeking a possible correlation between toxicity and chemical structure. It has been found that the use of the goldfish as the test animal eliminates many of the experimental difficulties that would necessarily obtain with the use of an insect in such a fundamental research. Since toxic action is an action in time, it was believed that for quantitative measurements it was necessary to measure time and therefore toxicity was defined with respect to the two variables, concentration and survival time. It has been emphasized that the relative toxicity of two substances may differ throughout the course of toxic action as expressed by these two variables and this is especially true of dissimilarly acting poisons such as, for example, rotenone and phenol. For this reason the minimal product of the two variables was suggested as a readily obtainable criterion of relative toxicity. Since there was a fear that it might be impossible to express the relative toxicity of compounds differing as greatly in speed of action as the two compounds mentioned, they have both been repeatedly used as standards of comparison in the work. In the four times they have been used in studies with different populations from the same breeding ponds, the relationship as expressed by the minimal product of concentration and time has been nearly the same despite a shifting with respect to the two variables for each population. This criterion appears, then, to measure a definite parametric characteristic of this test animal. This conclusion is again being brought out in a statistical analysis of a further study of the toxic action of the same two substances in which the temperature, necessarily held constant in the previous work, is treated as a third variable. Because of this definiteness, this work shows that toxicity for each compound, when measured according to the greatest efficiency with respect to concentration and time, increases geometrically as temperature increases arithmetically, at least between 17° and 27° C. As a corollary it follows that between these temperatures the relative toxicity of phenol and rotenone is the same at any definite temperature.

Additional organic insecticides patented.--Four United States patents covering synthetic organic compounds as insecticides have been granted members of the Division recently. Three of these were issued to L. E. Smith and the other to Milton S. Schechter and H. L. Haller. Patent Number 2,191,299 covers the use of iodoxybenzene and the three isomeric nitro derivatives. Patent 2,191,300 is concerned with the use of iodosobenzene and the ortho, meta, and para-nitroiodoso-benzenes. Patent 2,191,301 claims phenyliodochloride and mono-nitro derivatives thereof as insecticides. Patent 2,189,570 includes compounds of the class represented by alpha, beta dibromoethyl-benzene and alpha, beta-dibromo-beta-nitroethyl benzene.

BEE CULTURE

Lack of pollen in liquid food may cause supersedure.--Frank E. Todd, Davis, Calif., reports: "A colony on honey stores, stimulated by incoming pollen on favorable flight days, was expanding the broodnest normally for the period of the year. We wished to test a theory that it was the pollen in the nectar or honey which acted as a stimulus for egg laying. The honey stores (which contained pollen) were removed and the colony fed on sugar sirup. The honey was removed on January 6 and a rapid decline in egg laying followed, to the point where by January 15 no eggs were being laid. The colony was in a glass observation hive. The weather was such that field activity during this period was nil until January 26. On this date, although the colony was undisturbed by us, the bees were observed 'balling the queen.' This is a method used by bees to destroy a queen. They form a compact ball over her in an apparent attempt to smother her. We immediately fed the colony sugar sirup in which was suspended pollen. The queen was laying actively the next morning. This experiment suggests a possible cause of supersedure in package-bee colonies, as bees apparently react differently to the presence of a queen under different conditions. Thus, the nonlaying queen has been noted walking in the winter cluster with no more attention being paid to her than any other member of the colony, although a laying queen is usually surrounded by a "royal ring of bees," and appears to be constantly attended. It appears possible, therefore, that when conditions occur which cause a sudden cessation of egg laying, such as lack of pollen in liquid food, the bees react by attempting to ball the queen, as they might do in case of a failing queen. This behavior may be a factor in the early supersedure of queens in package colonies, as conditions in this case were similar to those which might be encountered in the early spring in areas receiving package bees."

Food consumption by emerging bees.--C. L. Farrar and C. W. Schaefer, Madison, Wis., report that pollen "cakes" or pollen supplemented with "nutrisoy" are consumed much more rapidly when young bees emerge than when a similar number of larvae are being fed without the presence of emerging bees. The following amount of food (dry weight) was consumed per young bee reared between December 5 and January 30: 0.92 g. (pollen); .078 g. (50 percent pollen + 50 percent nutrisoy); .062 g. (25 percent pollen + 75 percent nutrisoy); .062 g. (12.5 percent pollen + 87.5 percent nutrisoy); .048 g. (nutrisoy). Most pollens contain from 20 to 25 percent protein; nutrisoy, 50-52 percent. The pollen fed was from mixed sources obtained by trapping at the entrance of the colonies. The average numbersof bees reared per colony were respectively 8,800, 7,300, 5,500, 4,900, and 2,600, with two check colonies producing 350 and 800 each. One colony receiving 50 percent pollen reared as much brood as the best colony on pollen alone; the second reduced the average because of delayed egg laying by the queen. Twenty-five percent pollen is superior to 12.5 percent largely because the food remains in better condition over a longer period.

Variation in cultures of Bacillus larvae.--Laboratory tests have shown that cultures of *B. larvae* White, isolated from various localities, exhibit physiological strain differences, it is reported by E. C. Holst, Laramie, Wyo. Whether these strains vary in their pathogenicity, as well as in their physiological properties, remains to be determined. Further, apparently stable strains of *B. larvae* were induced to form mutant or "abnormal" strains by cultivation upon suitable media. These mutant strains, when returned to the stock culture medium, again reverted to the "normal" type.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Additional record for an apparently important anobiid beetle.--*Hadrobregmus destructor* Fisher (family Anobiidae) was described in 1938 (Jour. Wash. Acad. Sci. 28:26) from specimens received from Sitka, Alaska, where the species was said to have caused serious damage to wooden articles in the Sheldon Jackson Museum and to wooden columns of the building. Its work is similar to that of the European "death-watch" beetle, *Anobium punctatum* Deg., which it superficially resembles. Recently specimens, determined by W. S. Fisher as *H. destructor*, were submitted by the Division of Foreign Plant Quarantines. They had been intercepted at Seattle, Wash., in yew logs coming from Victoria, British Columbia, but the origin of the logs has not been determined.

Identity of weevil attacking canaigre.--In the October 1, 1939, issue of the News Letter (v. VI, No. 10, p. 21) there appeared a note regarding a large weevil attacking canaigre (*Rumex hymenosepalus*) at Las Cruces, N. Mex., where the plant is being grown experimentally as a source of tannin. At that time a single reared specimen was identified tentatively as *Ophryastes tuberosus* Lec. On February 28, 1940, 14 specimens of the weevil were collected on the soil close to canaigre plants at the same locality. With this series available, it is possible to confirm the previous identification. At the time the adults were collected, partially grown larvae were dug from the soil around the roots of the food plant, and it is probable that this species has a 2-year cycle. Apparently the larvae hatch in the spring and feed on the roots of the canaigre for more than a year before pupating, the adults emerging at the end of the second summer.

A new mosquito record.--Frank W. Fisk, of the *Aedes aegypti* Control Unit, Public Health Service, has recently submitted adult males and females, larvae, and larval and pupal skins of *Deinocerites spanius* (Dyar and Knab). Some of the adults were trapped at Brownsville, Tex., last December and others were reared from larvae collected in crab holes within 2 miles of the airport in February. This species has hitherto been known only from many adults collected in the Panama Canal Zone, on the Atlantic side. Larvae of the genus *Deinocerites* are usually confined to crab holes, but those of *D. spanius* may also occur in old tins. This species will attack man, and it is possible that it was brought to Brownsville by plane and became established there.

Specimens of the elephant bot received.--Four bot-fly larvae, determined by C. T. Greene as *Cobboldia elephantis* Cobb, were recently submitted by H. L. Van Volkenberg, of A. and M. College of Texas. They had been taken from the stomach and duodenum of a baby Indian elephant at Los Angeles, Calif. This elephant, 2 years old, was owned by the M. G. M. Studios and died about 3 weeks after arrival in this country.

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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR MARCH 1940

Vol. VII, No. 5 (Not for publication) May 1, 1940

ADMINISTRATION

Bureau Appropriations

The bill to provide appropriations to the Department for the fiscal year 1941 passed the Senate and is now being considered in conference. The bill as it passed the Senate provides more funds for the Bureau than would be provided by the bill as it passed the House. The amount of the bill as it passed the Senate is $6,773,093, being $1,128,292 above the amount provided in the House bill. The increases provided in the Senate above the House bill are:

Fruit Insect Investigations-- For continuing studies in Georgia and Texas on insects affecting pecans	$14,000
Mexican Fruitfly Control-- Restoration of increase in Budget estimate	15,000
Forest Insect Investigations-- Partial restoration of Budget estimate	25,000
Cereal and Forage Insect Investigations-- Expanding studies on grasshoppers and Mormon cricket	25,000
Barberry Eradication-- Restoration of part of the Budget estimate	25,000
Pink Bollworm Control-- Increase above Budget estimate	382,808
White-fringed Beetle Control-- (New item included in Budget estimates)	600,000
Insects Affecting Man and Animals-- Restoration of Budget estimate	31,500
Insecticide and Fungicide Investigations-- Restoration of Budget estimate	9,984
Total Senate increases above House bill	$1,128,292

The B. E. P. Q. Exhibit

The Bureau of Entomology and Plant Quarantine has on display in the Patio an exhibit of some of the outstanding individuals of the more than 750,000 known kinds of insects in the world. A few insects of unusual size, bizarre form, or striking color are displayed in a glass case. Among them are one of the largest moths, the Caesar moth, which measures 10½ inches between wing tips, and one of the smallest, European Rumex leaf miner, which is barely visible to the naked eye. Included in this display are such insects as moths, weevils, beetles, grasshoppers, cicadas, wasps, and bees. The colors of some are extraordinary, with such combinations as yellow and brown, yellow and purple black, ebony black with shadings of pale blue, and blue and green iridescent colors. Among the most beautiful of all those shown are two moths, one of deep shining blue with a blue-black border, and another of dark purple-blue and American Beauty red, tipped in velvet black.

One of the most beneficial insects, the honeybee, has its place in the exhibit, too. Inside a glass-walled hive, a colony of bees goes into its regular routine of honey making, oblivious of spectators. And for contrast to this modern beehive, an old fashioned straw skep is also displayed.

Most of the insects in the exhibit are those that add to the annual billion-dollar losses from insect pests. Potential pests are also included. The pink bollworm and the damage caused by it are displayed, along with a model of the machine developed by the Bureau to separate the larva of the pink bollworm from gin trash, making it possible to locate incipient infestations. Trash and worms go in at one end. The trash comes out in one place and the worms in another.

The way the Japanese beetle destroys many kinds of plant life is shown, as well as research in progress to work out effective control measures. A small mechanical man gives a demonstration of how to treat lawns with chemicals to destroy the Jap beetle grubs.

In the cross section of a frame house, models of termites move up and down through the tunnels they have carved in the wood. Next is the cross section of a house termite-proofed to keep out these insects. On one of the displays a short interesting history of the termite is given. The queen termite is the largest, the king, next largest. These are cared for by the workers. The soldier termites, next in size to the king, are protectors only and are dependent upon the workers for food.

Paintings of flower and vegetable insect pests are on display, as well as samples of their destructive work. A miniature duster to control the pea weevil and a miniature trap with which the flight habits of certain truck crop insect pests can be determined are shown. Depicted also are the methods entomologists use in studying the anatomy of insects. This calls for delicate dissecting instruments and special apparatus for analyzing insect blood and recording insect heart beats.

Plant diseases subject to Federal plant quarantines have a place in the exhibit. White pine forms the background for a diorama on one of the white pine's greatest threats--white pine blister rust.

The life history of the gypsy moth is visibly told by specimens from larvae to adult stage placed on a stump of a tree.

The extensive Federal-State control campaigns to suppress certain insect pests and plant diseases are also shown. These include the campaigns against the grasshopper and the Mormon cricket in the West, the white-fringed beetle in the South, and the Dutch elm disease in the East.

The exhibit is extremely attractive, and comprehensible to the layman, and shows an interesting phase of the work of the Department. It is well worth while. (Agricultural Exchange, Apr. 5, 1940.)

FRUIT INSECT INVESTIGATIONS

Raisin moth larvae in waste plums.--Samples of fallen plums, taken by Dwight F. Barnes, Charles K. Fisher, and George H. Kaloostian, of the Fresno, Calif., laboratory, gave data on the population per acre of larvae of Ephestia figulilella Greg. in 2 orchards of the early Beauty variety. Picking began on May 26. Much of the fruit was allowed to go to waste, both because of prorate rules as to size and on account of competition when later varieties ripened. Of 340 adults which emerged from the samples, 339 were raisin moths and 1 was E. elutella (Hbn.), the tobacco moth. All parasites which matured were the ichneumonid Idechthis canescens (Grav.). Some of the data are shown in the following table.

Date of sample collection	Estimated larvae per acre	Parasitization	Potential emergence of moths per acre
	Number	Percent	Number
Anderson orchard:			
July 24----------	231,840	12	204,019
Aug. 1-----------	143,451	20	114,761
Aug. 8------------	63,756	43	36,341
Aug. 15----------	28,980	25	21,735
Dudley orchard:			
July 24----------	34,228	7	31,832
Aug. 4-----------	26,703	18	21,896
Aug. 11----------	8,127	0	8,127

New laboratory for study of Comstock's mealybug on apple.--A new laboratory is being established at Charlottesville, Va., for a study of Pseudococcus comstocki Kuw. This insect has been known for a number of years as a pest of umbrella catalpa and has also been recorded on a wide variety of other hosts. In the last few years it has become increasingly important in apple orchards in widely scattered localities from South Carolina to New York and as far west as Ohio. The chief damage caused by this insect consists of the production of large quantities of honeydew, which supports the growth of a sooty mold. This causes the stunting and cracking of the fruit and such serious disfigurement that it is reduced to cull grade. In parts of some orchards the injury has been so severe that the crop is unmarketable. In the project just being started greatest emphasis is to be placed on biological control. Certain species of parasites have already been brought in from Japan by the Division of Foreign Parasite Introduction. These are being held at the Moorestown, N. J., laboratory, and releases will be made at opportune times during the season. An experiment is also being planned with the utilization of one of the ladybird beetles, which has proved effective on related species of mealybugs on citrus in California. Although this ladybird beetle is unlikely to survive the eastern winters, restocking might prove to be a profitable annual practice. G. J. Haeussler, who has been engaged in work with the oriental fruit moth parasites at Moorestown, has been transferred to Charlottesville to take charge of the new project.

MEXICAN FRUITFLY CONTROL

Fruitflies appear early in March.--The usual spring infestation of *Anastrepha ludens* Loew in the lower Rio Grande Valley began to appear early in March and at the end of the month larvae had been found in 84 plantings. All of these infestations occurred in grapefruit and in many of them only 1 fruit was infested. The catch of adults in traps mounted rapidly and almost half of the females were gravid. Fruit from infested zones was routed to sterilization plants before shipment. Although the fruit shows some signs of freeze damage, there was no indication that the sterilization treatment accentuated this. Sterilized fruit continues to arrive in the terminal markets showing little or no decay. Heavy rains in the latter half of March greatly benefited the entire area and caused one of the heaviest citrus blooms on record.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Chemical constituents of green corn tissue affect survival and growth of corn borer larvae.--G. T. Bottger, Toledo, Ohio, reports that laboratory tests with green corn leaf and internode tissue indicate that survival and weights of European corn borer larvae are affected by differences in percentages of moisture, sucrose, reducing sugars, and protein contained in food media. Although larval survivals and weights can be associated definitely with both chemical factors and different strains of corn, it is apparent that differences in chemical factors large enough to affect biological differences in test larvae are not peculiar to any particular strain. Such factors as sterility, portion of the plant tested, and stage of maturity apparently exert far greater effects on the chemistry of corn-plant tissue and development of larvae reared thereon than can be accounted for on the basis of strain influence alone. Differences in average weights of test larvae nourished on internode tissue from the resistant strain R4 X Hy and the susceptible strain A X Tr, when both were manipulated to effect high sugar concentrations, indicate the influences of additional factors, possibly of a physical nature, which in R4 X Hy tissue interfere with larval feeding or possibly subsequent digestion and assimilation of the tissue by the insect. Determinations of pH, by the electrometric method, of various kinds of food media and blood from both single- and multiple-generation larvae, indicate that the more favorable foods are less acid than are the less favorable ones, and that the acidity of green corn and beans is increased appreciably after 48 hours exposure to warm humid conditions, whereas that of green peas is not, and that the pH readings of larval blood varies more in accordance with food and age influences than with the generation character of the larvae under observation. Synthetic feeding media formulated for laboratory nutrition studies apparently meet the requirements of larvae in the early instars much better than in the later instars.

New insecticide materials tested against corn borer larvae.--D. D. Questel, Toledo, reports that of 54 new materials tested in the laboratory against newly hatched larvae of the European corn borer, E-1419 shows promise enough to warrant field tests against the corn borer if the material is available in sufficient quantity. In the laboratory tests this material caused mortalities of 100, 98, and 99 percent when tested at rates of 4 pounds, 2 pounds, and 1 pound, respectively, per 100 gallons of water.

Damage by European corn borer in 1939.--A. M. Vance, Toledo, submits estimates of damage by the European corn borer in 1939, as follows:

Area	Field corn	Sweet corn	Total
	Dollars	Dollars	Dollars
Lake States	1,582,292	354,328	1,936,620
Eastern States[1]	264,043	1,776,463	2,040,506
Total	1,846,335	2,130,791	3,977,126

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[1] Includes 19 counties in eastern New York and 15 counties in northeastern Pennsylvania.

Field-corn resistance to European corn borer.--L. H. Patch, Toledo, reports that in 1939 the collection of data to determine definitely the status of 16 inbred lines respecting their reaction to corn borer survival was completed. In addition, the status of another lot of inbreds has been indicated, although less conclusively. All lines have been tested as inbreds in comparison with known susceptible and resistant inbreds and in single-cross combination in comparison with the same known susceptible and resistant inbreds crossed on common parents. Results from the two methods of testing have been consistent without exception, showing that factors for borer resistance are inherited. Inbreds Ill. R4, Wis. CC5, Ia. L317, Mich. 77, and Mich. 106 have shown resistance to borer survival; inbreds Ind. TR, Ill. Hy, Ill. L, Ill. A48, Ia. I 205, Wis. CC1, and B.P.I. 540 have shown partial borer resistance; whereas inbreds Ill. A, Ind. WF9, Ill. 90, and U.S. 187-2 have shown marked susceptibility. These inbreds were tested in different combinations in a test of single crosses in 1939. Four single-cross hybrids each with 2 resistant inbreds in their pedigree, averaged 40 percent less than the number of borers predicted for strains with their dates of silking. Ten single crosses made up of a resistant and a partially resistant inbred as parents averaged 16 percent less than the predicted. Four hybrids with 2 partially resistant inbreds as parents averaged 1 percent more than the predicted. Eight hybrids with 1 resistant and 1 susceptible inbred as parents averaged 6 percent more than the predicted. Seven hybrids with 1 partially resistant inbred and 1 susceptible inbred as parents averaged 32 percent more than the predicted. Three hybrids with 2 susceptible inbreds as parents averaged 57 percent more than the predicted. Data collected from double-cross hybrids during 6 seasons were grouped according to the inbreds entering into the pedigrees. Two hybrids with 3 resistant and 1 partially resistant inbreds in the pedigrees averaged 42 percent less than the predicted numbers of borers. Thirteen hybrids with either 2 resistant and 2 partially resistant inbreds or 1 resistant and 3 partially resistant inbreds in their pedigrees averaged 18 percent less than the predicted. Seven hybrids with 2 resistant, 1 partially resistant, and 1 susceptible inbred in their pedigrees averaged 4 percent more than the predicted. Fourteen hybrids with either 1 resistant, 2 partially resistant, and 1 susceptible inbred, or 1 resistant, 1 partially resistant, and 2 susceptible inbreds in their pedigrees averaged 8 percent more than the predicted numbers of borers. The data show clearly the cumulative effect of multiple factors in producing borer resistance in corn. Practically, the avoidance by the corn breeder of susceptible inbreds in producing commercial hybrids is indicated.

Interrelation of factors affecting control of European corn borer.--According to C. A. Crooks, Toledo, the spring debris survey conducted in the 52 unit areas that contained corn in the fall survey of 1938 showed a reduction of 93.42 percent of the host-plant material (corn) and 96.94 percent of the borer population. The residual host-plant material in the 294 unit areas averaged 5.09 linear feet and 0.16 borer per square rod. Two groups of follow-up crops were established to determine the effect of their cultural practices on the residual populations. In group 1 (the cultivated crops--corn and truck crops) extensive cultivation reduced the number of linear feet of corn from fall to spring 95.50 percent and the borer population 99.33 percent; group 2 (noncultivated crops--small grains) showed a reduction of 90.90 percent of linear feet of corn and 93.78 percent of the borer population. The seasonal development of the borer was several days later in all stages in 1939 than in 1938. More favorable host-plant conditions, as measured by height of corn at peak of oviposition, contributed to a more general distribution of oviposition throughout the area, although considerably fewer eggs were laid in 1939 than in 1938. A higher percentage of the eggs hatched in

1939, owing to less predation and other reduction factors. More favorable conditions for larval establishment and survival resulted in a survival of 19.67 percent in 1939, as compared to 8.34 percent in 1938. The fall population and crop survey indicated little change in the percentages of crops grown in the area, with a total of 51 unit areas containing corn, as compared to 52 found in 1938. The 294 unit areas averaged 82.50 linear feet of corn and 7.95 borers per square rod in 1939, as compared to 77.26 linear feet of corn and 5.59 borers in 1938. No significant differences could be shown between these populations. From a total of 36 random sections, 3.4 percent of the larvae were parasitized, as compared to 12.4 percent in 1938 from 51 sections. However, a change in collection procedure from polar coordinate to random-section design might account for some of the differences between the percentages of field parasitization in the 2 years. No meteorological records were compared except rainfall, which showed in both years less rainfall for the season in areas adjacent to Lake Erie than in those a few miles inland.

Differentiation between one- and multiple-generation strains of corn borer.--K. D. Arbuthnot, New Haven, Conn., states that apparently a homozygous single-generation strain of the European borer has been isolated from laboratory rearings, whereas rearings of successive generations of multiple strain have been accomplished only with considerable difficulty. All multiple-strain lines have been lost after three or four successive generations, owing to failure to obtain mated pairs, nonproduction of eggs by mated moths, or to all of the eggs produced being infertile. The multiple-strain segregates from Toledo field stock have shown a general decrease in rate of production and fertility after the second generation. A rapid decline in productivity and fertility was apparent in the multiple strain (New Haven) material. The percentage of egg hatching in each successive generation decreased in all material reared in 1939. Survival of progeny was low in all material reared, being lower in the single-strain and multiple-strain segregates than in the multiple strain.

Differences in rate of growth of one- and multiple-generation strains of European corn borer.--Mr. Arbuthnot also states that the single- and multiple-generation strains of the European corn borer, which have been under observation in laboratory rearings, have different rates of growth, owing to inherent differences in the two strains. The population present in the field in the vicinity of New Haven contains a strain homozygous for multipleness. The population in the field in the vicinity of Toledo contains a strain of single-generation corn borers which, when isolated, has an inherently slower growth rate than the New Haven multiple-generation strain.

Interrelation of factors affecting corn borer abundance at Onley, Va.--D. W. Jones, Onancock, Va., says that in the study area at Onley, utilized for measurements of the various factors contributing to fluctuations in populations of the European corn borer, 145 observation points in the total of 400 sections included in the 100-square-mile area fell on cultivated land. In this area pupation of overwintering borers occurs the latter part of March or early in April, subsequent oviposition taking place during the first half of May. Oviposition for the second and third generation takes place during the latter part of June and the first part of August, respectively. Borer populations in the area are mostly restricted to corn and potatoes, the latter crop supporting the first generation and the remaining two generations developing on corn. Weeds are negligible as a host-plant factor in this area.

Parasitization of the borers overwintering in 1938-39 averaged 9 percent, all being parasitized by Lydella grisescens R. D. Parasitization of first-generation eggs averaged 2.7 percent, second generation 7.7 percent, and third generation 0.3 percent, all by Trichogramma. Egg predation averaged 23 percent on the second generation and 10 percent on the third, mostly by ladybird adults and larvae. No satisfactory measurement of crop condition of potatoes associated with time of borer infestation was devised. Early or forward corn had passed its attractive stage of development at the time of third-generation oviposition, these moths selecting late or potato corn on which to deposit their eggs. Larval survivals averaged 8.07, 6.33, and 23.49 percent for the 3 respective generations. The number of borers surviving averaged 0.45 ± 0.093 and 1.74 ±0.359 per square rod for the first and third generations, respectively, the means and the difference between them all being highly significant. The borer populations in debris in the spring averaged 0.19 borer per square rod.

Interrelation of factors affecting borer abundance in eastern Massachusetts.--According to E. W. Beck, Waltham, Mass., the spring debris survey conducted in the 29 unit areas that contained corn in the fall survey of 1938 showed a reduction of 91.48 percent in host-plant material and 95.25 percent in borer population. The residual host-plant material in the 289 unit areas averaged 0.605 linear foot of corn and 0.24 borer per square rod. Seasonal development began on May 8, with pupation of the overwintering larvae, emergence on May 29, and oviposition on June 3. Midoviposition occurred on June 22 and egg laying was completed by July 13. Of a total mortality of 73.44 percent from eggs to mature larvae, 23.06 percent occurred in the egg stage, the remaining 50.38 percent being due to reduction factors operating on the larvae. The total survival of first-generation larvae was 26.56 percent. Second-generation oviposition began on August 1, reached 50 percent on August 13 and 14, and was 100 percent by September 5. Of a total mortality of 85 percent from eggs to mature borers, 25.27 percent occurred in the egg stage and the remaining 59.73 percent in the larvae. Total survival of the second-generation larvae was 15 percent. The summer population survey averaged 9.66 borers per square rod. The fall population survey averaged 32.19 borers per square rod and 40.17 linear feet of corn, as compared to 13.11 borers per square rod and 18.35 linear feet of corn in 1938. No significant differences were found between the populations for the fall surveys in 1938 and 1939. Crop-condition and plant-maturation indices were earlier in 1939 for the first generation, with corn 3.5 inches taller at the peak of oviposition and pollen shedding and silking from 3 to 4 days earlier than in 1938. Second-generation indices were about the same as in 1938. Parasitization of the first-generation larvae was 19.08 percent, as compared to 25.72 percent in 1938. Records of second-generation parasitization in 1939 are still incomplete. Lack of rainfall and extremely warm weather during the summer months caused the corn to suffer from drought but no effect on the borer is apparent.

Nozzle arrangements for dusters and sprayers.--C. H. Batchelder, New Haven, states that comparison of the performance of two types of nozzle arrangements tested during this experiment indicate that the spray or dust discharge of nozzles on mechanically operated equipment was most effective when it was directed specifically at the points of most frequent borer entrance into the plant. Reduction of the number of borers in the plant and the protection of ears from infestation was accomplished most satisfactorily with nozzles directed laterally at the level of developing ears so as to leave a band of insecticide deposit on each side of the plants in the row. Incidentally, application at this level also provided increased protection for parts at lower levels of the plant. The borer reduction and yield increase obtained when nozzles were attached to the booms of mechanically operated implements closely approximated the effectiveness of hand-directed nozzle equipment with which very precise spot applications can be made. This would indicate that hand application had been duplicated mechanically with this nozzle arrangement. The performance of the overhead nozzle positions designed for general coverage indicates that general coverage is not so effective as spot application, which leaves greater quantities of insecticidal residues at specific points on the plant where larvae became established. The overhead method of distributing insecticides failed to deposit sufficient residues on or near the ears because of the "umbrella effect" of overhanging leaf blades. The results of these experiments show that motor-operated dusters and sprayers equipped with nozzle booms will provide more satisfactory performance when the arrangement of distributor tubes is adjustable and provides for lateral discharge at ear-level height.

Recovery of Inareolata punctoria Roman.--C. A. Clark, of the Moorestown, N. J., corn borer laboratory, reports that Inareolata punctoria Roman, an introduced ichneumonid parasite of European corn borer larvae, has been recovered from host collections made in Burlington County, N. J. The egg-larval parasite Chelonus annulipes Wesm. has been recovered for the first time in Connecticut following releases made in the spring of 1939 in the Connecticut River Valley.

FOREST INSECT INVESTIGATIONS

Furniss transferred to Fort Collins.--R. L. Furniss, formerly of the Portland laboratory, was transferred effective April 1 to take charge of the forest-insect laboratory at Fort Collins, Colo. During the 5 years of Furniss' assignment in the Pacific Northwest he completed a number of important studies, particularly a study of the hemlock sawfly (Neodiprion tsugae Midd.) and its parasites, the progress of insect damage in fire-killed Douglas fir, biology of the Douglas fir weevil (Cylindrocopturus longulus Lec.), a study of control methods for carpenter ants, and other general problems of the Douglas fir region.

Dry-site trees unfavorable for Dendroctonus development.--According to W. D. Bedard, of the Coeur d'Alene, Idaho, laboratory, those western white pine trees growing on dry sites, usually on high open ridges and other exposed areas, are unfavorable for the development of the mountain pine beetle. During the last 4 years, a total of 404 infested trees have been examined representing the 3 site conditions of wet, moist, and dry. Of these, 118 trees on wet sites produced an average of 28.0 new adult beetles per square foot, 118 trees on moist sites averaged 17.0 beetles per square foot, while 168 dry-site trees averaged only 8.5 beetles. An analysis of variance showed this difference between sites to be highly significant and more or less constant for different years. These findings indicate that broods in dry-site trees suffer a greater mortality than those in wet-site trees, probably because of the more rapid drying of the bark following the death of the tree.

Mortality of Scolytus multistriatus (Marsh.).--C. H. Hoffmann, of the Morristown, N. J., laboratory, has submitted a report concerning mortality of S. multistriatus larvae during the warmer months of the year. An elm tree cut on May 15, 1937, remained in the field until May 31. The stem was then cut into sections and placed in a rearing container in the laboratory yard. A total of 13,878 S. multistriatus adults issued during the summer. The sections were then barked and examined. It was estimated that if all the larvae had developed to the adult stage there would have been an emergence of 28,734 beetles. The data thus indicate that the larvae suffered a mortality of 52 percent. Previous studies had indicated, on the other hand, that mortality during the colder months of the year amounted to about 88 percent for this species.

Relation between North American and European species of dipterous parasites.--W. F. Sellers, New Haven, Conn., has been working on a revision of the North American parasitic two-winged flies belonging to Zenillia and allied genera. In many European and North American species which have been considered in the past by specialists to be Holarctic in their distribution and morphologically inseparable, there have been discovered in this study small differences that serve to keep their identities separate. This indicates a common origin of species that have been separated by geographical barriers for a sufficient length of time to be differentiated by small morphological characters, differences in biology, and in their host preferences. These individual peculiarities are maintained even when the forms are brought together in the same habitat either by artificial or other means of dissemination. While working on this revision, it has become increasingly evident that the only European species of tachinids that occur in North America are those which have been imported or have originally accompanied their hosts here. The taxonomy of six examples of the above-described phenomenon has been considered in the present study. Carcelia laxifrons Villeneuve, an introduced and established parasite of the brown-tail moth, is distinct from what was previously considered to be its American counterpart, an unnamed species which is parasitic on the Eastern tent and forest tent caterpillars. Carcelia reclinata Aldrich and Webber, a parasite of the North American tiger moths, is similar to Carcelia cheloniae Rondani, which is parasitic on the European tiger moths. C. cheloniae was the name erroneously used for C. laxifrons when it was introduced into the United States; C. cheloniae does not occur in North America. Phryxe vulgaris Fallen, a parasite of the imported cabbage worm, is distinct from the American Phryxe pecosensis Townsend, with which species it was once confused. P. pecosensis does not attack the cabbage worm. If P. vulgaris was not accidentally introduced, it accompanied the imported cabbage worm in its spread into North America. Townsend has expressed the opinion that P. vulgaris does not occur in North America and that its American equivalent is Phryxe hirsuta Osten Sacken. P. vulgaris is a synonym for P. hirsuta. Aplomya mitis Meigen, an introduced parasite of the European corn borer, has been confused with Aplomya caesar Aldrich, which is parasitic on the spruce budworm and other leaf rollers of the genus Archips. A variety of A. caesar is parasitic on the American Pyraustas, including the European corn borer, but it is distinct from A. mitis. The American equivalent of Aplomya confinis Fallen, a European species that does not occur in North America, is Aplomya theclarum Scudder, which is parasitic on the lycaenids, or gossamer-winged butterflies. Aplomya affinis of Aldrich and Webber (not Fallen) is an unnamed American species of this genus which is parasitic on the tiger moths. Aplomya affinis

Fallen is a European species that apparently does not occur in North America.

Injury to birch by roundheaded borer.--H. J. MacAloney, Milwaukee, Wis., received a request on March 11 for information concerning an insect larva taken from a piece of birch in the seat of a chair at Rockford, Ill. The chair has been in this home for 18 years, has never been repaired, and has never been out of doors so that oviposition could occur. The gallery is about 3 inches long. The species was identified by F. C. Craighead as Eburia quadrigeminata Say. Previous records give a life cycle of 3 to 20 years.

Ash and oak borers cause annoyance.--One of the most frequent causes of complaint by home owners in the Pacific Northwest, according to F. P. Keen, of the Portland, Oreg., forest-insect laboratory, is the emergence of large numbers of cerambycid adults from oak and ash firewood stored in their basements. With the first warm days late in winter or early in spring, adults of Neoclytus conjunctus Lec. and Xylotrechus nauticus Mann. begin to emerge, and for a few weeks complaints and requests for control measures are frequently received. This year the first emergence was noted on January 15 and 13 calls were received between that date and March 21. No control measures appear to be practical, but the trouble might be remedied by some change in the time of cutting and storing firewood in the field.

Matsucoccus scale weakens mature ponderosa pines in California.--Heavy infestations of Matsucoccus bisetosus Morrison have been observed on middle-aged to mature Pinus ponderosa trees near Middletown, Lake County, Calif., by H. L. McKenzie during the summer of 1939. Considerable top-killing, excessive branch-flagging, and a reduction in needle complement were evident, apparently as a result of scale feeding on these pines. During the fall of 1939 many of the scale-infested trees were subsequently attacked by the bark beetles Ips confusus Lec. and Dendroctonus brevicomis Lec. It is suspected that this same phenomenon exists in pine stands elsewhere in California. The Berkeley laboratory plans to initiate studies along this line in the future.

Mites attack artificially propagated predator larvae.--G. R. Struble, Berkeley, Calif., found that larvae of the green trogositid, Trogosita virescens F., left to hibernate in vials during the winter months at the Miami, Fla., sublaboratory were invaded by the mite Pediculoides ventricosus (Newport) which caused considerable mortality. Of 350 larvae set up, 40 percent died by March 19, 1940. The presence of mites actively feeding on several of the larvae strongly indicated the cause of death. This is a new obstacle which has developed, indicating the necessity for changes in the technique of artificial rearing of predators. Presumably the mite contamination was introduced by Dendroctonus monticolae Hopk. host larvae fed to each predator larva.

Mountain pine beetle infestation spotted by airplane.--Airplane spotting, supplemental to regular ground-crew marking of infested sugar and ponderosa pines over mountainous terrain, indicates surprising accuracy with regard to sizing up an infestation, according to G. R. Struble, of the Berkeley laboratory. A flight made recently by the Forest Service in connection with the Oak Flat Insect Control Project on the Sierra National Forest, in which counts of all red-top and fading trees were made, clearly indicated the extent and centers of heaviest infestation, and checked well with an accurate ground-crew survey of the area. The control area, composed of 16 sections of rough mountainous country, was stripped 4 times during the flight. The Oak Flat Project was financed jointly by the United States Forest Service and the Southern California Edison Company. This project was stimulated by a growing insect hazard in this highly valuable virgin commercial timber area. A total of 164 trees, having a volume approximating 600,000 board feet, were treated by felling and burning. Single sugar pines having a volume of 25,000 feet were common. The project was carried on between March 4 and March 26.

Mountain pine beetle broods heavy in sugar pine.--Overwintering broods of D. monticolae in sugar pine at Oak Flat, on the Sierra National Forest, were again heavy this year, according to Mr. Struble. An examination of the infested length of 2 trees, felled by insect-control crews on March 21, indicated an average population approximating 200 larvae per square foot of inner bark. Predator larvae were few in number, represented by fully grown larvae of Medetera aldrichii Wheeler and first-stage larvae of Enoclerus sphegeus F. It is estimated that the control work by felling and burning on this area of 10,000 acres will destroy between 10 and 12 million larvae of D. monticolae.

JAPANESE BEETLE CONTROL

Nurserymen welcome lowering of temperature requirements for methyl bromide fumigation.--Authorization in B. E. P. Q. 499 (Supplement No. 1, revised) on March 22 of a reduction below the previous minimum of 63° F. in the requirements for methyl bromide fumigation as a condition for Japanese beetle certification was very acceptable to the nurserymen now utilizing this method. The treatment schedules were widened to permit, in addition to the previous exposure of 2½ hours at 63°, exposures of 4 hours at 54°, and 4½ hours at 50°. The dosage of 2½ pounds of methyl bromide per 1,000 cubic feet was unchanged. This longer exposure period has resulted in overtime work for some of the inspection force. In the Philadelphia area one nurseryman operating a fumigation chamber is located 100 miles from the district office. The return trip plus the 4½-hour treating period occupies 10 hours or more. In the New Jersey area activities of another nurseryman have made it necessary for an inspector to be on the job at 7 a.m. in order that the fumigation box may be operated continuously during the day. A northern New Jersey nursery is completing a new fumigation box large enough to hold the equivalent of a carload of stock.

Japanese beetle trap supply being replenished.--Manufacture of 50,000 scouting traps to augment the Division's supply for use this summer was started in February and continued during the month of March. These traps are being stamped and formed from yellow-coated black iron sheets. The sheets are sufficiently large to permit the shearing off of a small strip that is then rolled and used as a shield around the glass bait bottle. Tests by the Division of Insecticide Investigations at the Moorestown, N. J., laboratory showed that the action of light on bait is detrimental, and the use of such a shield was recommended. Including the Division's reserve supply of scouting traps, there will be available a total of approximately 80,000 traps for the 1940 trapping program. At the same time the traps were being manufactured, 80,000 1-ounce bottles were filled with liquid bait and wicks were cut and stapled. Trapping is scheduled to start in Miami, Fla., on April 15, following which additional trap routes will be established by the same supervisor as he works his way north. Local trap inspectors will be employed to cover the routes as they are set up.

District and suboffices moved.--Arrangements were completed during March for the transfer on April 23 of the Richmond, Va., district Japanese beetle office from room 1005 in the Grace-American Building to space in the building already occupied by the tobacco-beetle project of the Division of Truck Crop and Garden Insect Investigations, at 17 North Boulevard. The former Japanese beetle inspection office at Twelfth Street and Constitution Avenue, Washington, D. C., was discontinued at the end of March. To replace this an inspection office has been established at the Experiment Station of the Bureau of Plant Industry at Glenn Dale, Md. W. N. Dobbs, formerly in charge of the District of Columbia inspection office, has been transferred to trap-scouting supervision in the Southern States. W. H. DeWaters is the inspector assigned to the new Glenn Dale suboffice.

Japanese beetle inspections brisk at Easter.--Several factors were reported by florists in the Japanese beetle regulated area as contributing to the disposal of large quantities of florists' stock during the Easter season, much of it from certified greenhouses. The southern freeze eliminated most of the outdoor-grown plant material usually sold in the north at Easter, and the freezing weather prevented the customary street vendors from setting up their stands or even occupying unheated stores. Although some of the florists were left with a surplus on hand after Easter, most of the classified florists for whom plants were certified reported a complete sell-out at good prices, despite the early and unseasonable Easter.

Soil treatment for Japanese beetle at Winchester, Va.--Application of lead arsenate to infested premises on which nine Japanese beetles were trapped during the summer of 1939 began on March 11 and was completed on April 3. A total of 29.5 acres was treated. The lead arsenate was purchased by the county of Frederick and the city of Winchester. Labor was furnished jointly by the fruit growers and the city. The State furnished a supervisor to get the necessary clearances from the property owners and this Division supplied the spray truck, operators, and a man to supervise the operation of the truck.

Japanese beetle inspection force increased.--A few additional inspectors were hired in March to take care of increasing demands for the inspection and certification of greenhouse and nursery stock in the southern part of the Japanese beetle regulated area. An extra inspector was employed for assignment during the remainder of the spring shipping season at one of the larger Delaware nurseries. Another of the recently employed inspectors was stationed from March 11 to 23 at a large greenhouse establishment in the Philadelphia area to handle the many shipments of certified Easter plants.

Increased domestic demand for New Jersey peat.--Peat dealers in New Jersey whose products are eligible for certification have reported that, because of the difficulty in obtaining peat from foreign countries, there is an indication that there will be considerable demand for the local product.

Certain substitutes have already been mentioned for possible use in place of foreign packing materials. Two of these are already in use, in the form of shredded sugarcane, and a mixture of ground corncobs and oat straw.

Ice storm increases potential elm bark-beetle material.--An ice storm on the night of March 3 and morning of March 4 caused widespread damage to elm trees in large sections of the Dutch elm disease infected area. In some sections this damage approached or exceeded the damage done by the hurricane of September 1938, particularly insofar as the production of elm wood subject to elm bark beetle attack is concerned. The principal damage by the hurricane was the blowing down of entire trees. The recent ice formation on the trees broke off large branches and left many hangers that must be removed before the next emergence of elm bark beetles. Ice on the trees was so thick that in sections severely affected there is scarcely an elm in which there are not one or more hangers. Additional work caused by the ice storm made it necessary to deviate from the regular work assignments to take care of the emergency situation. The Connecticut State Leader reported that the storm caused more potential beetle material than existed in the work locations before elm-sanitation work began in these areas. In the town of Ridgefield, Conn., a survey indicated that 100 men may be required for a year to remove and dispose of damaged elm wood. Much of this material along highways was removed by the end of the month. The Connecticut State Highway Department allotted $15,000 in Norwalk, $15,000 in Bridgeport, and $6,000 in Danbury for repair of highway trees broken by the storm. The Highway Department also removed dangerous broken material in other towns.

Hurricane lumber certified in quantities.--Since early last fall the inspector in the Manchester, Conn., district has inspected an unusually large number of ash logs for gypsy moth. In recent years it has been increasingly difficult to locate enough ash to supply demand. A considerable amount of ash timber has been conserved in the White Mountain National Forest; however, the hurricane of September 1938 felled many of these trees and made available ash lumber that would not otherwise have been cut. Many lumber operations have been in progress in this restricted district and many thousand feet of ash have been removed. In the White River Junction, Vt., district the inspector reports that the Northeastern Timber Salvage Association has started shipping peeled pulpwood from Randolph, Vt., to a paper mill at Shelden Springs, Vt. This inspector has also examined one carload of straight-edge lumber for exportation by way of Boston. He reports that thousands of cords of wood are piled at various railroad yards and sidings, some of which will be shipped to nonregulated areas. Lumber shipments from several other areas were reported as delayed by heavy snows and spring thaws that make many of the secondary highways impassable. The inspector at Westerly, R. I., examined for gypsy moth infestation a quantity of cross and switch ties cut from hurricane lumber and sold to one of the New England railroads. Considerable time was spent in this inspection because the ties were stored in small lots at scattered locations. The inspector at Keene, N. H., made his first inspection of government-owned lumber, consisting of two carloads, in March.

Gypsy moth eggs scrambled by grinding machine.--Tests run at one of the New Hampshire sawmills have demonstrated that the process employed there is adequate to destroy any gypsy moth eggs that may be on material passing through their grinding machine. On the basis of these tests, sawdust produced by this firm is granted certification for shipment to points outside the gypsy moth regulated area. Early in January several hundred gypsy moth egg clusters were mixed with shavings and run through the grinder that converts the shavings into sawdust. The resulting sawdust was collected and taken to the Waltham, Mass., field headquarters where several hundred apparently uninjured eggs were removed by screening and hand picking. These and an equal number of eggs that had not been run through the grinder were placed in similar containers and kept at room temperature. Within 30 days emergence from the check eggs began and by the end of 70 days most of the check eggs had completed hatching. There had been no emergence from eggs that had passed through the grinder. Recently some 200 of the eggs from the sawdust were examined under a microscope. Of the lot that appeared normal, two-thirds were actually cracked or partially collapsed, apparently by mechanical injuries received in the grinder, and the remaining third were intact but appeared to contain no living larvae. Most of the latter eggs were transparent, with the exception of a small dark splotch on one side. When these were broken open and the interiors examined, it was found that they had dried out and that the dark splotch was the contents that had apparently settled at the bottom. Other eggs were only semi-transparent. When these were broken open the insides of the shells appeared to have been smeared with some varicolored material, indicating that the eggs had been literally scrambled.

Usual additions to New England gypsy moth inspection force not needed.--No temporary men were employed in the inspection of nursery stock during March in the gypsy moth infested area of New England. Deep frost in all sections prevented digging, even in the Newport, R. I., district, where it is usually possible to start digging late in February or early in March. With an unusual amount of frost still in the ground at the end of March many of the nurserymen feared cancelation of orders, since the late digging season shortens the period of time in which plantings can be made. There was at least 4 feet of frost in the ground in western Maine at the end of the month. The only movement of certified nursery stock in quantity from the New England area consisted of stock previously inspected and stored in warehouses. The district inspector at Westfield, Mass., certified for movement from the regulated area or to other classified dealers one carload, four truckloads, and three large freight shipments of such stored material. In the Keene, N. H., district heavy snow in the woods held up pulpwood shipments, while at Stafford, Conn., the snow was so deep that ties were hauled from a lumber yard to the highway by tractor and sled. Granite sheds in the Quincy, Mass., district were just resuming their operations at the end of the month.

Gypsy moth infestations destroyed in certified products.--Car stakes, lumber, cut hemlock, mixed greens, railroad ties, buoys, and cedar poles comprised the articles from which 25 gypsy moth egg clusters were removed in the course of the month's inspection. Most of the finds were of single egg masses.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Heavy snow and rain make gypsy moth work difficult.--The first week in March provided the most unfavorable conditions that have been encountered during the winter throughout the entire region where gypsy moth work is conducted. A heavy fall of wet snow forced the temporary suspension of work in Vermont, while rain and snow fell intermittently in Massachusetts and froze on the higher elevations. In Connecticut and Pennsylvania rain and sleet formed a heavy coating of ice on trees and highways, breaking many branches and making automobile travel extremely hazardous. Very little gypsy moth work could be done during the first part of the week in any section, and in some sections of Vermont no work was possible during the entire week. Measurements showed that the snow averaged 5 feet in depth at high altitudes in the mountainous region of northern Vermont, but only about 10 inches at lower elevations. In Berkshire County, Mass., the depth of snow near the summits of the Housatonic and Taconic Ranges averaged up to 4 feet in the forests. The snow was well packed and provided excellent snowshoeing for the gypsy moth workers, although ledgy slopes rapidly became hazardous to traverse because of ice formations resulting from thawing temperatures at midday followed by freezing nights. Many roads were blocked by the snow and others became extremely icy and slippery, which interfered considerably with the transportation of gypsy moth workers. Another snowstorm and heavy rains toward the end of the week caused further interruption of the work in many regions. While the streams rose rapidly and were somewhat choked with ice, there appeared to be no immediate danger of serious flood conditions in the New England area.

Hunger drives wild birds to feed near farm buildings.--The gypsy moth supervisors report that hunger has driven game birds, particularly pheasants, to seek food around farm buildings, as their natural food was buried deeply beneath the snow. The wild birds were frequently observed feeding with the poultry in the farmyards.

No gypsy moth infestation found in previously infested town.--The entire township of Essex, Chittenden County, Vt., was carefully scouted during last December and until March 19. No indication of a living infestation was found, despite the fact that this town was infested in 1936. Intensive treatment work done at that time included the thinning of approximately 40 acres of ledgy, rock-strewn woodland in which oaks and other favored food plants of the gypsy moth predominated. This was followed in the spring of 1936 by the application of burlap bands, which were methodically patrolled throughout the larval season. During the month of June, in the same year, about 85 acres was thoroughly sprayed with lead arsenate. No infestation has been found since that time in Essex.

Several small gypsy moth infestations located in Vermont.--The scouting of Brandon Township, Rutland County, Vt., was finished late in March, the work resulting in the discovery of five small gypsy moth infestations. The treatment work at some of these colonies is still incomplete because of the presence of deep snow. It is expected, however, that this work will be finished early in April, as well as the work in Hinesburg, Chittenden County, where tree growth in several large bogs and swamps was examined under ideal conditions earlier in the winter, when all swampy areas were solidly frozen over long before the heavy snowfalls occurred. Three additional infestations were located in Middlebury, Addison County, during the latter part of March, but it will be impossible to determine accurately the extent of any of them until after the snow melts and permits the careful examination of deadwood and other ground debris. Two additional infestations were found during the first part of March in Bristol, Addison County, and close scouting in this town will not be completed until the snow has melted. In general, chopping work at the various infestations progressed satisfactorily during the month, despite transportation difficulties and the temporary suspension of work in some sections because of severe weather. At infestations where the snow was exceptionally deep most of the chopping was confined to removal of the larger defective trees.

Deep snow reduces production of maple sugar and sirup.--Considerable maple sirup is produced annually throughout the State of Vermont and in Berkshire County, Mass. Although some snow during the sugaring period is desirable, there has been so much of it in the woods since the middle of February that many farmers have postponed their sugaring work because of the difficulty of breaking roads through the forests so that the sap can be gathered. The sugar season is rapidly drawing to a close, and it is now predicted that less maple sugar and sirup will be produced this year than usual.

Broken egg clusters prevalent where ice storms were frequent.--The percentage of broken gypsy moth egg clusters found increases as the season advances. This condition, though not unusual, seems to be particularly prevalent this winter in the Berkshire region of Massachusetts and also in northwestern Connecticut, where ice storms have occurred frequently. As high as 75 percent of the egg clusters were recently found to be broken in some localities, and numerous cases were found where only the outlines of the egg clusters remained. As individual eggs and the broken parts of the egg clusters cannot all be found in the debris on the forest floor, additional measures for the eradication of the insect will be necessary at such locations.

Cleaning and thinning work resumed in Connecticut.--Treatment work at the gypsy moth infestation in Southbury, New Haven County, Conn., was temporarily suspended during the first part of March, as the deep snow interfered materially with the removal of worthless smaller trees and bushes. Later in the month work was resumed in this area, but at that time it consisted mainly in the removal of several very large defective trees. These trees were cut down and split to sizes that could be easily burned, as the property owner did not want the wood for fuel. At the end of the month it was possible to resume the work of removing the smaller growth, as the snow was melting rapidly. Progress at this infestation was necessarily slow during March. A small crew of men was engaged in climbing trees, aided by ropes, in the center of this infestation, to creosote gypsy moth egg clusters that could not be reached from the ground. Although these men originally knew nothing about climbing with ropes, they quickly became proficient in this branch of the work.

Map revision started in Connecticut by gypsy moth employees.--In Connecticut two experienced agents employed by this Bureau recently started revising township maps used in scouting work. Although most of the maps of towns in the barrier zone region of Vermont, Massachusetts, and Connecticut are prepared to a uniform scale and are reasonably accurate in most respects, some are still drawn to scales difficult to compute. Whenever available, data from United States Geological Survey maps are used, particularly the data pertaining to roads, trails, streams, ponds, and important elevations.

Dead chestnut trees prevalent in western Connecticut.--Chestnut originally comprised a substantial proportion of the forest stand in western Connecticut, as is evidenced by the large number of dead chestnut trees still standing in nearly every wood lot where gypsy moth thinning work is being conducted. Despite the fact that practically all of the chestnut trees have been dead for 15 or more years, as high as 50 percent of the deadwood which must be felled and destroyed at many of the infested locations in Connecticut is chestnut.

Timber cutting for mining industry leaves littered wood lots.--The coal mining industry in eastern Pennsylvania draws heavily on the forests over a wide area centering around the Wilkes-Barre-Pittston-Scranton area for mine props and laggings. As a result, thousands of acres of cut-over woodland are left which are covered with tangles of treetops left after timber suitable for the mines has been removed. These areas are exceedingly difficult to scout, and when gypsy moth infestations are found in such localities, a great deal of work is necessary to clear the wood lots of the dead treetops, which must be cut up, piled, and burned. Many of the infestations found in Pennsylvania this winter are situated in such areas, and an enormous amount of work has been required to clear away the deadwood and slash.

Gypsy moth infestation found in rubbish-littered yards.--Owing to severe weather conditions in Pennsylvania during the first week in March, gypsy moth work was largely confined to settlements in the Susquehanna River Valley, where the ice storms were less rigorous. In the course of scouting the district of Dunmore Borough in Scranton Township, Lackawanna County, an infestation of more than 200 gypsy moth egg clusters was found in the rubbish-littered yards of 2 adjoining properties where a large quantity of old lumber was piled. It was necessary to examine all of the rubbish and to repile the lumber in order to uncover and treat the hidden egg clusters.

Inspection of shipments in Pennsylvania quarantined area.--In the area of Pennsylvania quarantined on account of the gypsy moth, where eradication measures are in progress, it is of major importance that the reinfestation of cleared areas be prevented. For that reason, materials likely to contain gypsy moth egg clusters are prohibited from being moved from one part of the area to another section without inspection and certification. During 1 week in March, quarantine inspectors found 23 gypsy moth egg clusters on shipments of surface stone originating in Pittston Township, Luzerne County, and destined for a resurfacing project in the neighboring borough of Dupont. Dupont was generally infested by the gypsy moth several years ago, but it is now practically free of the insect. During the same period, several egg clusters were found on mine timbers originating in Plains Township, Luzerne County, and 5 additional egg clusters were found on firewood from the same wood lot and consigned to an address in Wilkes-Barre. All egg clusters were destroyed by creosoting before the shipments were allowed to proceed to their destination.

C. C. C. gypsy moth work reduced in March.--During the week ended March 2, the C. C. C. used 2,253 6-hour man-days on gypsy moth work under the supervision of this Bureau in the area east of the barrier zone. This amount gradually decreased to only 1,293 man-days near the end of the month. The decrease was largely due to the completion of an enrollment period at the end of March, when many enrollees left the camps because of the expiration of their time limit, and also to the abandonment of the camp in Greenfield, Mass., toward the end of the month. Several experienced enrollees from the Greenfield camp were transferred to the camp in Westfield, Mass., where their training will be of great assistance. The camp formerly located in Westfield was moved farther east in December 1938, and concentrated on fire-hazard-reduction work. This camp was recently returned to Westfield and has begun gypsy moth work in that vicinity. Many of the men now members of the camp have not had gypsy moth experience and must undergo necessary training before starting actual work in the field.

Results of C. C. C. gypsy moth scouting.--The scouting work so far done by the C. C. C. has shown a considerable spread of the gypsy moth in Massachusetts and Connecticut, with large and healthy but more or less scattered egg clusters. Extensive areas of severe infestation, such as were present in these States during the last few years, have not been discovered and the pockets of heavy infestation are much smaller; however, extremely heavy infestations have been found in Vermont, particularly in the towns of Westminster and Rockingham, and the scouts have also found scattered infestations, denser than usual, as far west as they have scouted in Grafton, Windham County. A crew from the State gypsy moth office has assisted in rapid scouting work north and east of the area treated in Granby, Conn., last summer, in order to determine the present condition of this region. Some pockets of heavy infestation were found, but this area is generally in much better condition than last year. This crew has also rapidly scouted an area of approximately 1,000 acres south of the Granby area, at Simsbury and Canton, in an attempt to locate favorable areas for autogiro spraying. No extremely heavy infestations were discovered, but areas were found where the infestation ranged from 100 to 500 egg clusters per acre, and a few plots were found with over 500 egg clusters to the acre. The crew is now doing intensive work in this region laying out plots of 100 acres each to be used for autogiro spraying next June. A suitable landing field for the autogiro located within a reasonable distance from the areas to be sprayed has not yet been discovered.

Orders issued by C. C. C. for spraying equipment and supplies.--Three high-powered spraying machines were ordered by the C. C. C. in March, two of them to be used for gypsy moth spraying in Connecticut and one in Massachusetts. Orders were also issued for 25 tons of lead arsenate for use in Connecticut and 7 tons for Massachusetts, together with an adequate amount of fish oil. As this spraying equipment may not be available for use during the approaching spraying season, arrangements have been made with this Bureau for the loan of sufficient spraying equipment to use the material ordered. The C. C. C. will furnish the labor required, in addition to the supplies, during the spraying season. The Connecticut State entomologist's office will aid in supervising the work in that State and will furnish trained men to operate the spraying machines and to handle the spray nozzles.

C. C. C. gypsy moth training fits men for outside specialized work.--A memorandum issued in March by the War Department notified C. C. C. camps in the First Corps area that a tree-expert company had a considerable number of openings for men who were accustomed to climbing trees by the use of ropes. Many men now in C. C. C. gypsy moth crews, as well as former members of the crews, have received this training, and some of these men have been offered the positions. An examination of the termination slips of C. C. C. enrollees on file at this office revealed that 134 enrollees who had been employed on gypsy moth work for at least 6 months had had rope-climbing training and were recommended by their foremen for this type of work. The names and addresses of these enrollees have been furnished to the tree-expert company.

PLANT DISEASE CONTROL

Barberry eradication.--When field activities of labor crews were closed for the season in October, George W. Eade, State leader of barberry eradication in South Dakota, devoted much of his time to the informational program. Through the cooperation of the county superintendent of schools in Clark County, arrangements were made to present illustrated talks in all rural schools in that county on the eradication of common barberry bushes for the control of stem rust. A total of 79 rural schools was visited and home-survey cards were left at each school to be returned when the children had inspected their home properties for barberry bushes. One of the principal objectives of this type of program is to locate planted bushes that may have been missed during the early part of the campaign. Upon completion of visits to all rural schools, contacts were made with all independent districts in the county where talks illustrated with lantern slides were given in all city schools of the county, as well as in rural consolidated districts. This resulted in an intensive informational program for the county since no schools were omitted. At the request of the instructors, illustrated talks have since been given to the Smith-Hughes agricultural classes at St. Lawrence and Miller in Hand County. Plans are being completed to carry on similar work in the C. C. C. camps operating in the State. Most of these camps are located within the Black Hills. This area was inspected by a farm-to-farm survey in the middle 1920's but has never been covered by an intensive survey. In Nebraska Marion E. Yount, leader of barberry-eradication work, reports that survey work was resumed on April 1. Two field supervisors and 29 laborers began work in York, Merrick, Wheeler, and Holt Counties. Wherever possible field crews will make use of data transferred from aerial photographs to soil-survey maps.

Nursery-inspection work in 1939.--During the 1939 season requests for nursery inspection, for the interstate movement of immune species of Berberis and Mahonia, were received from 46 nurserymen and 1 seedsman in the Eastern and Middle Western States. As a result of these requests, L. M. Ames inspected 13,633 acres of nursery stock from which 9,414 susceptible barberries were removed. Of these nurseries 44 were issued permits to ship barberries but 2 were unable to meet the requirements. While on his inspection trip, and in cooperation with State leaders of barberry eradication, approximately 3,800 susceptible barberries were removed from other nurseries and private homes, bringing the total number of susceptible barberries destroyed to 13,214.

Post-hurricane blister rust notes.--C. C. Perry, in charge of blister rust control work in Massachusetts, gives us some interesting notes on observations on the area devastated by the hurricane in September 1938, with particular reference to its effect on white pine. One of the natural inquiries following the devastation caused by the hurricane was speculation as to the degree to which the 1938 pine seed crop would restock the areas. It was reasonable to anticipate that with the disturbance of the soil, due to the uprooting of so many trees, and from salvage and fire-hazard-reduction operations, successful regeneration would occur. Casual observations made by the blister rust district leaders and others, while not conclusive, seem to indicate that regeneration has not been satisfactory. While it is possible that seeds are still viable and seedlings may develop in 1940, the situation in general is rather disappointing. Observations by the United States Forest Service in the Hampden-Hampshire district revealed that in 45 quarter-acre plots, 11 showed no 1939 seedlings. In 28 plots there were from 1 to 50 seedlings per plot. In 4 plots there were from 51 to 100 seedlings per plot, and only 2 plots showed more than 100, with a maximum of 147. There is one reassuring sidelight on these particular studies, however, and that is that in most instances seed trees are still present in or near the areas and these may serve to restock the ground. Search for an explanation of the apparent failure of the 1938 pine-seed crop to restock these areas leads to the plausible conclusion that normal germination may have taken place, but that the extremely dry conditions during the summer were fatal to the young seedlings. No concerted effort has been made to determine the degree to which Ribes have regenerated on the hurricane areas, but casual observations do not indicate that any great amount has occurred. Mr. Clave, district leader in blister rust control work in Massachusetts, comments that during the Ribes-eradication season many blow-down areas were looked over to determine whether there had been any regeneration of Ribes. He reports that no seedlings were found. He did find one gooseberry bush in Charlton, Mass., which had increased in live stem by at least 200 percent during the 1939 growing season because the white pine which had shaded it was down. There have been a number of other instances where the growth of Ribes has been definitely stimulated by the removal of the overhead in the stand. Mr. Perry, who was particularly interested in the condition which prevailed in the white pine areas in the coastal towns in Bristol and Plymouth Counties where salt spray during the hurricane severely "burned" the crowns of the pines, made several trips to the affected areas and reports that apparently the damage, in general, was of a temporary nature, resulting in inferior growth during the 1939 growing season and possibly during 1940. Areas of blown-down timber hampered Ribes-eradication work; however, the extensive clean-up work by the United States Forest Service and allied interests made it possible to work many areas that otherwise would have been entirely impassable.

New England townships cooperate in blister rust control.--Reports from town meetings held in New England recently show that 41 townships in Maine appropriated $7,675 for cooperative blister rust control work. In addition, the town of Rumford, Maine, will expend an unknown amount for transportation. The amount appropriated in the State this year shows a slight increase over the 1939 cooperative funds. In New Hampshire 21 towns had appropriated $6,400 up to March 15. One town, not having appropriated funds since 1920, made available $400 which will be needed to begin reeradication work. Indications point to possibly larger appropriations this year than last.

Spread of blister rust.--Blister rust infection on white pine has been reported in two new locations in Michigan, namely, Alger and Delta Counties, at locations far removed from previous known infection. The infection in Alger County consisted of young cankers dating in origin from 1933 to 1936. Six cankers were noted in a small unprotected wood lot but, judging from the dense Ribes population, it is believed that several more cankers exist in the same area. One 1931 canker was noted in Delta County. These new infection centers extend the known range in counties in which blister rust on white pines had previously been reported. Blister rust infection was reported for the first time in Blackhawk County, Iowa. The disease was found on old Ribes nigrum leaves on which the blister rust had been present in 1939. Pine infections were found on February 29 in Highland County, Va., in the George Washington National Forest on Area 38-F, where 4 pines out of 50 examined were infected, and on March 11 on Area 23, where 37 out of 150 pines were infected. On March 13, in Page County, Va., 1 pine was found infected in Fall Hollow.

COTTON INSECT INVESTIGATIONS

Winter mortality of pink bollworm.--H. S. Cavitt and O. T. Robertson, Presidio, Tex., made examinations during the latter part of February and in March to determine the winter mortality of pink bollworm larvae overwintering in bolls on cotton plants and in bolls on the soil surface. These examinations showed that there was very little winter-kill in either of these environments. The mortality on the stalks was 12 percent and on the soil surface 2.8 percent, averaging 7.4 percent for the two environments. Similar examinations in the two preceding winters, 1937-38 and 1938-39, showed an average mortality of 34 percent for the two environments each year. There was apparently no relationship between the worm mortality in the bolls and the number of hours below freezing during the 3 years. The winter of 1937-38 was mild with a minimum of 19° F. and a total of 134 hours below freezing, whereas the winter of 1938-39 was cold, with a minimum of 18° and a total of 402 hours below freezing, yet the worm mortality was the same, 34 percent for both winters. Although the winter of 1939-40 was not unusually cold (minimum temperature 16° F. and a total of 341 hours below freezing), it was exceptional in that a 2-inch snowfall was recorded and during one period the temperature did not go above freezing for 40 consecutive hours. The examinations indicated, however, that the snow and the prolonged cold had very little effect on the worms in the bolls. In addition to the examinations to determine the winter mortality of the larvae overwintering in bolls, observations were also made this year to determine the winter mortality of the larvae overwintering in the debris on the surface of the soil and in the soil. These observations indicated that there was a much higher mortality in the surface debris and soil than in the bolls. At the beginning of the winter, surface debris collected from 75 square yards in three unplowed fields showed an average of 0.84 larva per square yard, whereas 150 square yards from the same fields in the spring showed an average of 0.24 larva per square yard, or a winter mortality of 71 percent. The examination of 25 square yards of soil in the same three fields during the early part of December showed an average of 7.3 larvae per square yard and the examination of 45 square yards in the spring showed an average of 2.8 larvae per square yard, or a winter mortality of 61 percent. Most of the worms in the surface debris and soil are in cocoons and are not as well protected as the worms in bolls. Soil examinations in another field that had been disked and irrigated in January showed a mortality of 84 percent, or 23 percent more than in the unplowed field, despite the fact that the disking and plowing was done too late in the season to cause the maximum increase in mortality.

Pink bollworm survival in New Mexico.--A pink bollworm survival record of considerable interest was made at Malaga, Eddy County, about 15 miles from Carlsbad, N. Mex. This is the first time hibernation studies have been conducted in this area, as in previous years the infestation has been too low to afford suitable material. Last fall a small field of cotton was found that was rather heavily infested. Bolls from this field were placed in hibernation cages in November and examinations made during the last week of March showed a survival of 3 worms per 100 bolls that had been lightly buried and of 11 worms per 100 bolls left on the soil surface over winter. Soil examinations also showed a carry-over of 0.6 larva per square yard in this field. The recovery of live larvae from each of the 3 environments definitely established the fact, for the first time, that the pink bollworm survived the winter in New Mexico. The lowest temperature recorded in this section was 7° F. at Carlsbad.

Boll weevil survival.--Additional data on the effects of the unusually low temperatures on the mortality of boll weevils have been obtained since the report in the February News Letter. In Spanish moss collected in northeast Louisiana last fall, 189 live weevils per ton were found by R. C. Gaines and assistants, as compared with an average of 54 live weevils per ton during the previous 4 years (1935-38). In the examinations of moss from the same locality during March 1940, no live weevils were found and it is doubtful if any survived in moss in the vicinity of Tallulah; however, the examination of ground trash from woods near cottonfields showed different conditions. Last fall an average of 2,243 live weevils per acre were found in the ground trash and in March of this year 190 live weevils were found, or a survival of about 8.5 percent. Examinations of ground trash have been made for the last 5 years and only in the spring of 1939 has a larger number of live weevils been found in this material. In the spring of 1939, 225 live weevils per acre were found, representing a survival of about 15 percent. Nearly twice as many weevils were found in the ground trash during the fall of 1939 as in 1938 (2,243 versus 1,284 per acre), therefore we may expect as many weevils to emerge from ground trash in 1940 as emerged in 1939. As no live weevils have been found in the examinations of Spanish moss and no weevils have emerged to date in the hibernation cages, it appears that all of the weevils have been killed in such shelters as moss and cornstalks and that we will not find as many weevils in the cottonfields in May and June as were found in 1939. Similar examinations of ground trash at Florence, S. C., by F. F. Bondy and assistants, showed an average of 176 live weevils per acre in the spring of 1940, as compared with 3,582 in 1939 and 1,476 in 1938; however, some live weevils were active in the hibernation cages during March at this locality, in contrast to no activity at Tallulah, La. Eight active weevils were observed in the cages, as compared to 1,809 in 1939 and 1,168 in 1938. This was the fewest active weevils since March 1936, when only 5 were observed. The minimum temperatures at Florence were 2° F. in 1936 and 13° in 1940. At Tallulah the minimum temperature was -8° in 1940, the lowest recorded since the station was established there in 1909. The covering of snow, which lasted for 12 days, undoubtedly afforded considerable protection to weevils in ground trash at Tallulah, whereas the temperatures were not low enough at Florence to kill all the weevils in Spanish moss and cornstalk shelter.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Cotton planting in southern Texas and lower Rio Grande Valley of Mexico.--The acute drought in the lower Rio Grande Valley and Coastal Bend district continued until the latter half of March, retarding to a large extent the planting of the 1940 cotton crop. By the end of the month, however, all counties in southern Texas, as well as the regulated area on the Mexican side of the Rio Grande, had received sufficient moisture for planting, and this activity was going forward at a rapid rate wherever it was dry enough to get into the fields. Cotton planting in the lower valley area of south Texas is usually done from January to May, as sufficient moisture is received; therefore, in order to bring about a more uniform fruiting date, a regulation was issued by the State Department of Agriculture early in the year restricting cotton planting in that area to the period February 20 to April 1 for the 1940 season. However, in recognition of the severe drought in that area, which made it impossible to complete planting prior to April 1, the Commissioner of Agriculture issued a statement to growers on March 15 to the effect that additional time would be allowed for planting, and an order was later promulgated extending the date to April 20. By the end of March cotton was up on approximately 75,000 acres in the lower valley on the American side of the Rio Grande and was making rapid growth. It is estimated that this earliest cotton, planted February 20, will begin to put on small squares by April 20. On the Mexican side of the Rio Grande hundreds of cotton planters were in operation toward the latter part of the period, and it was estimated at the close of March that about 35 percent of the acreage had been planted. In the Coastal Bend district about 60 to 70 percent of the cotton acreage had been planted in Nueces County prior to the rains, but only a very small percentage had been planted in other counties of that district as a whole. At the end of March, however, planting was in progress over the entire district wherever the soil was dry enough to permit.

Destruction of sprout cotton in the lower Rio Grande Valley and Coastal Bend area.--For several months an intensive program has been under way in the lower Rio Grande Valley of Texas for the elimination of sprout cotton, in order to maintain a host-free period for the pink bollworm until the cotton planted in 1940 shall have reached the fruiting stage. During the first half of March from 16 to 18 grubbing crews were engaged in this work, which was interrupted on the 19th on account of heavy rains throughout the valley. During the period sprouts were grubbed from 9,934 acres, representing the most advanced growth in the area. This made a total of 73,009 acres grubbed since the beginning of this activity. A survey of the entire lower valley counties, which was made following the rains, showed that sprouts were making rapid advancement on account of very favorable growing conditions. The survey further showed that over half of the land planted to cotton in 1939 contained some sprout cotton, but none of these sprouts were found bearing fruit and, with the combined efforts of the farmers, who are cooperating in taking out sprout plants while they are working their lands, and our grubbing crews, it is believed all of these will be eliminated before they have an opportunity to put on fruit large enough to maintain the pink bollworm. When the rains began, all of the lands containing cotton sprouts left from plantings prior to 1939 had been covered and all visible growth removed. Work will be concentrated for the next few weeks in the 1939 fields. Later on, after the moisture has had time to bring out sprouts from any roots that remain on abandoned acreage, a final check-up will be made, which should eliminate those fields, totaling some 40,000 acres, from further consideration. Following the rains, considerable sprout cotton began to appear in some fields on the Mexican side of the Rio Grande. At the end of the period good progress was being made in the elimination of these plants, and it is hoped that the host-free period may be maintained in that area until the planted cotton reaches the fruiting stage. Only a comparatively few fields were found in the Coastal Bend district during the period where plants were beginning to put on new growth. Contacts were made with the farmers, and at the end of the month plants had been removed from the greater part of this acreage. As the result of rains in that area, planting operations are now going forward rapidly and it is believed the remaining cotton will be destroyed before fruit forms.

Pink bollworm program in Arizona.--Because of the excellent results obtained from the control program carried out for the 1938-39 crop season in the eastern part of the Salt River Valley, Pinal County, and the Santa Cruz Valley, in southern Arizona, it was considered advisable by State and Bureau officials to include the entire State of Arizona in such a program for the 1940 crop. This plan called for planting of the cotton crop, together with irrigation and cultural practices, in such a manner as to retard the fruiting of cotton until around the 10th or 15th of June; discontinuance of the practice of growing stub cotton throughout the whole of Arizona, and the elimination of all soca or sprout cotton on abandoned acreage or in fields planted in 1940. That part of the program having to do with stub cotton is for the purpose of creating a host-free period prior to the fruiting of cotton planted in 1940. In this connection, Agricultural Adjustment Administration authorities, in cooperation with this Bureau and with Arizona agricultural officials, included a provision in the 1940 conservation program whereby all cotton growers in Arizona are required to destroy stub or volunteer cotton not later than May 10. Farmers who do not comply with this regulation will be ineligible for conservation payments in 1940. This same rule, in regard to stubbing, was invoked by the A. A. A. last year, but covered only a part of the State. During the latter part of March stalks on 1939 cotton acreage were being rapidly destroyed in all areas.

Wild-cotton eradication.--Some years ago it was found that wild cotton existing in southern Florida and adjacent keys, involving approximately 16,000 acres, was heavily infested with the pink bollworm. Following this discovery, inspection of domestic cotton in northern Florida and southern Georgia revealed incipient infestations of the pink bollworm, which meant that this insect was making its way from wild cotton into the Cotton Belt. An undertaking was then begun to eliminate this menace by the eradication of its host, wild cotton, and excellent progress has been made. The second cleaning of the season was in progress at the beginning of March over most of the Florida area, and a third cleaning was under way on Key Largo. During a recent survey of the entire Florida Bay area a small colony of virgin cotton was found on Madeira Point, on the Dade County mainland. Inspection of 400 bolls taken from this cotton yielded 63 specimens of the pink bollworm. Incidentally, the section where this new cotton was found was directly in the path of the 1935 Labor Day hurricane, and excellent growing conditions had been created by destruction of the dense hammocks and undergrowth. Wild cotton was also found on several small keys during the rescouting of the Florida Bay area, where it did not occur prior to 1935, when a survey of that region was made. In the Cape Sable area, where the second cleaning of the season was started the first of the month, 4,020 acres was cleaned, 926 plants with mature bolls and 44,016 seedlings being removed. This is approximately one-tenth of the number of plants destroyed in that area during the first cleaning of the season. For the month, a total of 6,175 acres was cleaned in the Florida district, from which 1,958 plants with mature bolls, 57,068 seedlings, and 26 sprout plants were removed.

Thurberia-plant destruction.--A program was begun several years ago for the removal of Thurberia plants from the Tortillita Mountains and the southern slopes of the Santa Catalinas. This undertaking was determined upon when it was found that these plants were heavily infested with a boll weevil which was making its way to adjacent domestic cotton in southern Arizona. The Santa Catalina Range is now being covered for the second time. In one section of this range, which was burned over by a forest fire a few years ago, Thurberia plants have been particularly numerous. Most of the large plants were burned completely to the ground, but the stubs were not killed. Many of these stubs have put out new growth at a tremendous rate and the seedlings are particularly vigorous, this condition resulting possibly from the admittance of sunlight and enrichment of the soil by the considerable amount of ashes. During the period 4,720 acres was cleaned and 93,773 Thurberia plants were located and destroyed.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Early spring movement and medium population of beet leafhopper expected in southern Idaho.--J. R. Douglass and his associates at the Twin Falls, Idaho, laboratory, report that, after considering all pertinent factors at the close of March, it appears that an early movement may be expected of the spring generation of Eutettix tenellus (Bak.) from the desert breeding areas to the cultivated districts, but that only a medium population will be involved in this movement. This report gives all information available on probable E. tenellus populations in southern Idaho during the coming spring and early part of the summer and is not applicable to other areas. Early spring surveys of the desert breeding areas in 1939 showed the lowest overwintered population of beet leafhoppers since 1936. Growth of green tansymustard, an important spring-breeding host plant, was very sparse in most sections. The spring generation of beet leafhoppers in southern Idaho was very small, owing to the low population of overwintered leafhoppers and a scarcity of favorable host plants. The suitability of Russian-thistle, the most favorable host, was reduced, partly because the Russian-thistle was intermixed with downy chess, a nonhost, and partly because the summer host was stunted and dried prematurely, owing to the hot dry summer. This unsuitability of the summer host plant, combined with a very small spring generation, produced the lowest fall population of beet leafhoppers ever recorded in southern Idaho. Weather conditions during the first week of October were generally favorable for widespread germination of fall- and winter-host plants of the beet leafhopper; consequently, the beet leafhopper left its summer and hold-over hosts with little delay and entered the winter under favorable conditions. Deficient precipitation during the remainder of October, November, and December 1939, with above-normal temperatures for all 3 months, was unfavorable for survival of the fall-germinated plants. This resulted in a very scant, though general, stand of host plants available for food during the fall and early part of the winter.

Favorable weather conditions for a widespread germination occurred again near the close of February 1940, so that now conditions are favorable for a fair stand of spring-breeding host plants. Fall surveys in the Sailor Creek sagebrush area, one of the most important overwintering and spring-breeding areas, showed a very low late-fall population. The winter of 1939-40 has been mild and was dry up to the beginning of January. Excessive precipitation in January and nearly normal rainfall in February have kept the soil wet during the last 2 months. The lowest temperature recorded was 7° F., which indicates that the temperature conditions have been very favorable for survival of leafhoppers. Recovery from hibernation cages confirms this conclusion. Experience has shown that a mild winter and early spring, like 1933-34, advances the date of movement of the spring generation. It is possible, however, that if the present winter is followed by a cool wet spring, as in 1938, the movement of the spring generation will be delayed. As spring conditions greatly affect leafhopper populations and the time of movement, a second statement based on spring surveys will be issued later. Regardless of later weather conditions, relatively high populations may be expected, in cultivated sections close to breeding grounds. In summarizing, it may be stated that a low population entered hibernation under favorable conditions. The host-plant conditions varied from favorable to unfavorable and back to favorable during the fall and winter, with an outlook for a fair stand of spring-breeding host plants. The winter was favorable for survival of the leafhopper.

Control of cabbage caterpillars on fall cabbage.--W. J. Reid, Jr., of the Charleston, S. C., laboratory, summarizes the results of a control test conducted in South Carolina from August 1939 to February 1940, to determine the effectiveness, under conditions approximating the local production of fall-grown cabbage, of the control schedule that gave most promise in previously conducted experiments against the more common species of cabbage caterpillars. He states that, although the field involved in the test was exposed to the full effect of high cabbage-caterpillar populations, consisting principally of the cabbage looper, the imported cabbage worm, several species of Agrotinae including the corn ear worm and cutworms, a highly profitable crop of excellent quality was produced. The yield of the field, as indicated by samples taken, was as follows: (1) 11.2 tons of cabbage considered marketable as U. S. Grade No. 1, comprising 87.5 percent of the total yield, 52.5 percent of the total cabbage produced being classified as "extra-fancy," estimated to weigh approximately 5.9 tons per acre; (2) 5.5 percent considered not marketable as U. S. Grade No. 1, on account of caterpillar damage; and (3) the remainder, or 7.0 percent, considered unmarketable because of defects other than caterpillar damage, chiefly injury caused by low temperatures. The estimated cost of the insect-control treatments was $19.50 per acre and up to the close of March the sale of the crop had reached an average of $151 per acre. The cabbage was planted on August 2, the early part of the planting season for fall crops in the Charleston area. A total of 10 insecticide applications were made at approximately 10-day intervals from the time the plants came up until the caterpillar infestation ended with the advent of cold weather. The first of the applications was made on August 21 and the last one on November 15. The first 7 of these applications were made during the preheading stage of plant growth and consisted of the use of a dust mixture composed of 1 part of synthetic cryolite (containing approximately 83 percent of sodium aluminum fluoride) and 2 parts of talc at an average rate of 20.8 pounds per acre. In addition to the cryolite, the material used for the first 2 applications (the second of which was a repeat dusting necessitated by a 1.16-inch rainfall) contained 1.0 percent of rotenone, the rotenone being added in an effort to combat a heavy infestation of several species of leafhoppers. The remaining 3 insecticide applications were made during the heading period of the cabbage and consisted of a dust mixture containing 1.0 percent of rotenone with clay as a diluent, applied at an average rate of 22.4 pounds per acre. The results of this test corroborate those of previous experiments to the effect that fall-grown cabbage in South Carolina can be protected against caterpillars by using cryolite dust mixtures during the preheading period, followed by the application of dust mixtures containing rotenone while the cabbage is heading.

Potato or tomato psyllid fails to survive winter on red cedar in cages.--R. L. Wallis, of the Scottsbluff, Nebr., laboratory, reports that by the close of March complete mortality had occurred in the adults of Paratrioza cockerelli (Sulc.) placed in hibernation cages on red cedar last October. Examinations at weekly intervals disclosed that in November approximately 50 percent of the psyllids were dead in from 3 to 5 weeks after they were placed in the cages. By the close of December approximately 84-percent mortality had occurred. This indicates that P. cockerelli does not overwinter in red cedar, as was formerly supposed, or that weather conditions during the winter had afforded very unfavorable conditions for its survival on red cedar. Negative results were obtained in an attempt to determine whether P. cockerelli had overwintered on various green plants, such as evergreen trees, and in dried materials, such as leafmold, weeds, and under loose bark of various species of trees.

INSECTS AFFECTING MAN AND ANIMALS

Insecticide tests for control of Chaoborus larvae.--A. W. Lindquist, of the Nice, Calif., laboratory, reports the following results of laboratory tests with various insecticides: "Preliminary work last year indicated that Chaoborus larvae are killed by comparatively high dilutions of certain insecticides. More detailed work this quarter has shown good kills in the laboratory with pyrethrum, phenothiazine, carbon tetrachloride, trichlor ethylene, and certain mixtures of these. Over 90-percent kill was demonstrated at a dilution of 1/6,000,000 of a 15-to-1 pyrethrum. A pyrethrum solution containing 1.0 gram of total pyrethrin per 100 cc. in Diesel oil (3 parts) and carbon tetrachloride (2 parts) gave good kill in dilution of 1/10,000,000, and better than 60-percent kill at 1/30,000,000. Phenothiazine gave 100-percent kill at 1/4,000,000 and indicated a 100-percent kill or moribundity at 1/10,000,000. Phenothiazine inactivates Chaoborus larvae, and from all external appearances, the larvae are dead; but heart action and some gut action may continue for 3 weeks. Larvae may recover in 4 days."

Starlings attack grubs in cattle.--The following account of birds feeding on cattle grubs is reported by E. W. Laake, of the Dallas, Tex., laboratory: "One of the several cases reported in Texas of starlings attacking grubs in the backs of cattle occurred in the vicinity of Dallas. This interesting case occurred at the McCoy Dairy but did not come to our attention until March 21, when the dairy was visited by Mr. Wells, of this station. During the winter large flocks of starlings and blackbirds had gathered around the barn lots of dairies, resorting to the gleanings of feed which they could salvage. No doubt the number of the birds was increased by refugee flocks escaping the snow farther north. By the latter part of January the number of these birds was prodigious. About the first of February snow and ice covered the soil for a few days, and at that time many of the birds were observed to be pecking at some grubs in the backs of the cows. Fortunately only a few grubs were to be found in the cattle. The herdsman observed several instances of such attacks. The birds (starlings, he said) would peck into the lesion and, grasping the grub with the bill, would pull and jerk until, as he often observed, the grub was actually extracted. He believed that the birds were attacking only the grubs; he observed no cases where apparently the flesh of the host was sought. The cattle squirmed and moved about during the performance. He was sure that the lesions were not aggravated by subsequent pecking after the grubs were taken. Nevertheless, at the sites of the lesions attacked, on 8 or 10 of the cows, large, ugly infections occurred. Enormous swellings followed, without much suppuration. Eventually the skin sloughed away from the entire swollen area, disclosing a spongy, perforated mass. The lesion now was a wide, raw sore, from 1 to 8 inches in diameter. Eventually (in 4 to 6 weeks) the spongy center of the lesion sloughed out in a cone-shaped mass, leaving an open raw crater, which gradually healed. No more than 1 lesion occurred on any cow, but it may be that each of the victims had only 1 grub. Maggots had occurred in 1 of the lesions but had been controlled by applications of medicine."

FOREIGN PLANT QUARANTINES

Fruitfly on running board.--As an inspected car from Mexico was starting away at Hidalgo, a mango seed was seen in the corner of the running board next the car. The car owner said it must have been tossed there by some one else while he was in Mexico. A small amount of flesh surrounding a black spot on the fruit had been left uneaten. Upon inspection this very small amount of pulp on the seed yielded three dead and two live specimens of Anastrepha ludens (Loew).

Small boy has fruitfly larvae.--On Thursday afternoon, March 14, the Pan American plane came to a halt at the Brownsville airport. Among other passengers, hurrying off to be admitted and to arrange passage for a visit to other points in the United States, was a lady and her young son from Guatemala. The lady was passing Customs inspection while her son was enjoying a cold drink in the more or less inconspicuous background, when it was observed that the boy had something, probably of interest to us, in his coat pockets. He was called to accountability and removed from one coat pocket a piece of fruit claimed to be a "caimito," which was later identified as a star-apple (Chrysophyllum cainito) and a mango from another coat pocket, both having originated in Guatemala. Subsequent inspection disclosed the star-apple to be infested with larvae of Anastrepha sp.

Navy cooperates in inspection of airplanes from Hawaii.--When the U. S. S. Enterprise returned to San Diego during the month from Pearl Harbor, T. H., 82 airplanes flown from the vessel while several miles out at sea were inspected at the North Island Naval Airport several hours before arrival of the ship. Splendid cooperation given us by naval officials at the airport made inspection possible of this large number of airplanes in a comparatively short time.

Intercepted at the line.--When Rafael Torres, of Salt Lake City, Utah, crossed the international bridge at Laredo, Tex., on January 2, Inspector J. T. Watt found the following plant material concealed in his car: 4 jobo plums, 2 haw apples, 3 guavas, 3 sweet limes, 1 orange, 2 tangerines, ½ pound green orange leaves, and 12 bulbs. He was fined $5 by Customs for petty smuggling.

Rice pest intercepted at Savannah.--On January 2, L. A. Mayer, inspector in charge at Savannah, picked up three dead beetles on the deck of the American S. S. *Steel Age*, which came from Calcutta, India, via Capetown, Union of South Africa. These beetles were identified as *Hispa boutani* Ws. This record is of interest because the original description records this species as very injurious to rice culture in Tonkin, and the presence of dead specimens on the deck of this ship would seem to indicate that the beetles were rather abundant at one of the ports of call.

Citrus blackfly intercepted.--Specimens of the citrus blackfly (*Aleurocanthus woglumi* Ashby) were intercepted at Boston on December 4, 1939, on two sour limes (fruits) in cargo from Dominica.

Correction for list of intercepted plant pests.--On page 46 of the "List of Intercepted Plant Pests, 1938," issued November, 1939, *Marmara* sp. should have been given as the pest intercepted on the hosts Cactus to *Phaseolus lunatus macrocarpus*, inclusive, under *Macrosiphum luteum*.

Entomological interceptions of interest.--Living larvae of the dark fruitfly (*Anastrepha serpentina* Wied.) were intercepted at Boston on February 27 in an orange fruit in ship's stores from Trinidad. A living adult of the tenebrionid *Salax lacordairei* Guer. was taken at New York on March 8 on paper packing for grapes in cargo from Argentina. Living specimens of the mite *Eriophyes tulipae* Keifer were found at El Paso, Tex., on November 29, 1939, on garlic in baggage from Mexico. A living adult of the weevil *Conotrachelus flavangulus* Champ. arrived at New Orleans on September 15, 1939, on a banana fruit in cargo from Nicaragua. Living specimens of the coccid *Asterolecanium urichi* Ckll. were taken at Washington, D. C., on July 12, 1939, on a leaf of *Guilielma speciosa* in express from Brazil. A living adult of the chrysomelid *Metriona tuberculata* (F.) was intercepted at Seattle, Wash., on January 5 with banana debris in cargo from Guatemala. A living specimen of the cicadellid *Empoasca solani* DeL. was found at Laredo, Tex., on December 29, 1939, on Swiss chard (*Beta vulgaris cicla*) in baggage from Mexico. A living adult of the chrysomelid *Pseudomesomphalia punicea* (Chev.) was intercepted at San Francisco on November 10, 1939, on *Musa* sp. in cargo from Guatemala. A living specimen of *Chirothrips falsus* Priesner was taken at Brownsville, Tex., on October 21, 1939, on an orchid in cargo from Mexico. A living adult of the weevil *Sitona lineata* L. was intercepted at Philadelphia on November 20, 1939, on Chinese cabbage (*Brassica chinensis*) in ship's stores from the Netherlands.

Pathological interceptions of interest.--*Ascochyta* sp. (no species described on orchids) was intercepted at Seattle on March 8 and 12 on *Cymbidium eusifolium*, *Cypripedium callosum*, *C. fairieanum*, *C. hirsutissimum*, *C. parishii*, and *C. spicerianum* from India. A form of *Aspergillus niger* Van Tieg. producing sclerotia, was intercepted on sour limes from St. Lucia, British West Indies, on October 31, 1939, at New York. Citrus canker

(*Bacterium citri* (Hasse) Doidge) was intercepted on pomelo from Siam on October 21, 1939, at New York and from Java on February 13, 1940, at Boston; on rough lemon from Java on March 4 at Boston; and on sour lime from the Philippines on March 5 at Philadelphia. *Cercospora musae* Zimm. was intercepted at Brownsville on February 19 on the first shipment of bananas from a Mexican area near the Guatemalan border. *Cercospora rhododendri* March and Verpl. was intercepted at Seattle on October 21, 1939, on rhododendrons from Canada. *Helminthosporium allii* Campanile, which is frequently found on garlic, was intercepted on onion from Mexico four times during March at Brownsville. *Heterodera marioni* (Cornu) Goodey was intercepted on *Daphne genkwa* from Japan on February 14 and on *Jasminum* sp. on February 21 from Italy, at San Francisco. *Mycosphaerella citrullina* (Smith) Gross. was found on *Momordica charantia*, cucumbers, chayotes, and melons during the winter shipping season at New York. Most of the shipments were from Cuba but Holland, Italy, Jamaica, and Portugal were represented also. An undetermined species of *Phoma*, previously intercepted from Syria, was found on chayotes from Mexico on October 31, 1939, at El Paso. *Phragmidium rosae-acicularis* Liro was found on leaves of rose plants from Canada on October 28, 1939, at Seattle. *Phyllactinia corylea* (Pers.) Karst. was intercepted on November 21, 1939, at El Paso on locust leaves from Mexico. *Puccinia heterospora* B. and C. was intercepted at El Paso on November 8 and 10 on leaves of weeds belonging to the genus *Anoda* of the mallow family. *Pucciniopsis caricae* Earle was found to be more or less general on a number of shipments of papayas from Cuba arriving at New York in February and March. *Septoria darrowii* Zeller was intercepted on blackberry leaves from Mexico on November 15, 1939, at El Paso. Sterile leaf spots apparently caused by *S. hydrangeae* Bizz. were found on hydrangeas from Mexico on October 30, 1939, at El Paso. *S. lycopersici* Speg. was found on tomatoes from Mexico on November 8 at El Paso. The same disease was found on tomatoes in the field in Hawaii on February 5. *Mycosphaerella rubi* Roark and *Septoria rubi* Westd. were found on raspberry leaves from Mexico on November 11, 1939, at El Paso. *Uromyces caryophyllinus* (Schrank) Wint. was intercepted on carnations from Guatemala at a Brownsville airport in February.

Spotted cattails from Mexico.--Cattails are used as packing for fish from Mexico. For several years specimens of these cattails with sterile spots have been sent in for determination. During October, November, and December such specimens from El Paso were found to have some spots on which fruiting bodies had begun to form. Thus far these fruiting bodies have not been determined to species but they belong to a species of *Gloeosporium*. It is hoped that better material will become available at some time, so that determination or description of the species will be possible.

DOMESTIC PLANT QUARANTINES

Mormon cricket hatch necessitates dusting.--The first report of Mormon crickets hatching this year came from Malheur County, Oreg., on March 8, the identical date on which the first hatch in 1939 was reported from Klickitat County, Wash. By March 14, this year, hatching was reported from various places in Oregon and Washington, and from five counties in Nevada. In Montana hatching occurred the week ended March 23, and reports from Utah came a week later. Dusting was begun on March 25 in the vicinity of Halfway, Baker County, Oreg., employing both hand and power dusters, and 45 C. C. C. men were being assigned by cooperative Federal agencies to assist in these operations.

Grasshopper hatch in California.--Grasshoppers of migratorial tendencies (*Melanoplus mexicanus* Sauss.) were starting to hatch on March 8 in Palo Verde Valley near Blythe, Calif. From Kern County entomologists reported that on March 28 *Schistocerca vaga* Scudd. was being found in the adult stage and others in the first and second instars. The situation as to these infestations was well in hand, however, according to the county agricultural commissioner.

More aircraft on control projects.--Four additional airplanes have been purchased by this Division, two light aircraft for scouting primarily in areas where grasshoppers with migratorial tendencies occur, and two biplanes, one for use in distributing grasshopper bait and the other in applying dust over areas for such pests as the white-fringed beetle and the Mormon cricket. Grasshopper baiting by autogiro and biplanes proved successful in the summer of 1939, over rough territory impracticable to reach with mechanical spreaders. During that season, a cub plane was used effectively for contacting ground workers to direct application of bait, and for scouting and survey work in Texas and adjoining States. In eastern Montana and western North Dakota, planes were contracted for bait spreading primarily over brushy river and creek bottoms. A summary of operations for the 1939 season shows that 5,000,000 pounds of grasshopper bait was spread over 260,000 acres, with the use of 14 airplanes, at a cost of 23.6 cents per acre. Airplanes were also used last year for spreading calcium arsenate dust over large areas of waste land in the outlying districts of New Orleans for controlling infestations of the white-fringed beetle. A more uniform coverage was obtained than by other methods of dusting, and the use of aircraft was found to be a very satisfactory way of treating a large expanse of waste land or of areas overgrown with thick vegetation.

Organizational work on 'hoppers and crickets goes forward.--Meetings to work out cooperative procedures in each of the various States were held in February and March, in 17 infested States, by Federal and State officers engaged on the control of crickets and grasshoppers, and memoranda of understanding are being completed. The State Leaders Committee, which had been appointed to work in a liaison capacity, met at the field headquarters office in Denver on February 27-28. Committee members from Minnesota, Montana, Nevada, Colorado, and Kansas were present. Field supervisors in Colorado, South Dakota, and North Dakota have conducted publicity and organizational meetings. In Colorado alone, 48 such meetings have been held.

Egyptian alfalfa weevil.--Scouting for the Egyptian alfalfa weevil in March resulted in finding additional infestations in the Winterhaven area of Yuma Valley, Calif. Larvae and pupae continued to be found in the University of Arizona date garden at Tempe, and damage to sourclover and bur-clover was evident at several points. Scouting in alfalfa areas and sweeping sourclover and bur-clover along the main routes of travel in five counties in southern California resulted in finding no new infestations.

Larval survey for white-fringed beetle.--In order to obtain an indication of the population of the white-fringed beetle, as compared with 1939, a larval survey was made in March on a number of properties in the infested areas at New Orleans, La., and Gulfport, Saucier, Laurel, Carriere, and Bolton, Miss. Square-foot samples, dug 8 inches deep, were taken at favorable spots and the soil carefully examined. Last year the samples taken in May and June in these same localities showed an average population of 14.37 larvae per square yard. This year the survey in March gave an average of 5.07. It is realized that larval populations vary with several influencing factors. It is apparent, however, that the control measures of the past year have effected a substantial reduction in the beetle population. At Mobile, Ala., Baton Rouge, La., and Bolton, Miss., points where eradication is being attempted, but 3 larvae have been found this year. These were in the Mobile area.

Land clearing for white-fringed beetle control.--Over 1,000 acres of brushland heavily infested with the white-fringed beetle, in the vicinity of New Orleans, was cleared in March in an excellent manner by W. P. A. labor. This work is enthusiastically received by local residents, by police and fire departments, and by health authorities, as bringing about improved conditions in their fields of work. While on this clean-up work, the W. P. A. workers were responsible for saving the life of a young woman found starving and unconscious in a remote shack. A Federal-State W. P. A. project has been approved for similar work in Mississippi.

Other activities under white-fringed beetle project.--Regulatory activities were greatly increased in March, owing to spring demand for nursery stock and the movement of soil in road construction. Some quarantine violations were intercepted. There was considerable activitiy on the part of New Orleans nurserymen in making their plants eligible for certification, and 72 units meeting certification standards for plunging and growing beds were completed and placed in operation during the month. In the Monroeville, Ala., area, arrangements have been made with operators of all the larger farms, in planting their corn and beans, to leave out every thirtieth row so that the power dusters may pass without damaging crops. On March 15 a meeting was held at New Orleans with nurserymen and others concerned with the white-fringed beetle quarantine regulations. Pest-control officers of Louisiana and Georgia were present, as well as a number of Bureau representatives. The 1940 control program was discussed and it was arranged that a committee of nurserymen and of other affected interests meet at regular intervals with the project workers to consider problems arising from the conduct of the control work at New Orleans.

Methyl bromide treatment for white-fringed beetle modified.--The instructions in circular B. E. P. Q. 503, issued on November 21, 1939, provided for treatment of nursery stock by a solution of methyl bromide for larvae of the white-fringed beetle and limited the treatment to balled and burlapped nursery stock with soil balls not larger than 6 inches in diameter, and provided for an exposure of 24 hours at temperatures of 70°F. or above. As a result of more recent investigations, the instructions are now revised to provide that soil balls 7 inches in diameter may be so exposed for 8 hours at a minimum temperature of 65°, for treatment of larvae of the more common species of the beetle, Pantomorus leucoloma Boh. The revised circular became effective March 15.

Peach-disease work program for 1940.--In general the 1940 work policies on the Federal-State phony peach and peach mosaic disease projects will be the same as those of last year, continuing the three general phases as follows: (1) Inspection of nurseries and their environs within a radius of a mile, and in the case of the mosaic disease, inspection also of budwood sources and such environs; removal by May 15 of all mosaic trees, and by June 30 of all phony trees from the 1-mile zones of nurseries. In the mosaic area, reinspection will be made of peach nurseries in the fall, prior to defoliation. (2) Orchard inspection and the removal of diseased trees from orchards. (3) Removal of escaped and abandoned trees. Geographically, the plans include the reinspection for the phony peach disease of all properties found infected since 1937, and those adjacent, in Illinois, Kentucky, Arkansas, North Carolina, South Carolina, Tennessee, Texas, and Missouri. Complete inspection, including yard trees and orchards in areas of Georgia, Alabama, Mississippi, and Louisiana, is proposed. In the mosaic area the plans provide for complete inspection and eradication of diseased trees in the lightly infected areas in Arizona, Colorado, Oklahoma, Texas, and Utah; intensive orchard and yard inspections in the commercial area of southern California and the more important commercial area of New Mexico; surveys beyond known limits of infection and attempt to eradicate any incipient infection found, conditioned on available funds and trained personnel; educational work in New Mexico, Texas, and Arizona, in cooperation with county agents, and State pest-control officials, to acquaint growers with the seriousness of the mosaic disease and the necessity for removing infected trees.

Over 81 million peach trees removed under the two peach-disease projects.--A summary of tree-removal work, which has been carried on for the control of phony peach and peach mosaic diseases from August 1935 to the close of the year 1939, shows that 81,209,992 abandoned and escaped host trees have been destroyed. These were growing on 185,000 properties in 17 States. The work has been accomplished by relief labor. Such labor has been made available for continuing the work in 1940 in Alabama, Arkansas, California, Colorado, Georgia, New Mexico, South Carolina, Tennessee, Texas, and Utah.

Three States modify their peach quarantines.--Following the recent announcement of the results of the cooperative inspection in 1939, in which it was found that the phony peach quarantine restrictions could be lifted from 2 entire States and 24 counties in other States, the pest-control officials of Alabama, Illinois, and Missouri have revised their quarantines to modify the area according to 1940 standards. Uniformity of quarantine action is maintained by these States.

Peach mosaic in the last 4 years.--The peach mosaic work of the last 4 years, as summarized by counties, shows that inspection has been conducted in 679 counties of 25 States. The 52 counties found infected in 1939 represent a decrease of 11 counties in the number found infected in previous years.

Sweetpotato weevil being eradicated.--Gregg and Shelby Counties, Tex., were released in March from quarantine on account of the sweetpotato weevil, no such infestations having been found in these counties for a year. With the apparent eradication of the weevil from these two counties, and from Upshur and Smith Counties a year ago, it is believed that a weevil-free zone of approximately 75 miles from the more extensive commercial plantings in northeastern Texas has been created through the Federal-State campaign activities.

Transit-inspection activities.--The State of Michigan has assigned an inspector to pinch-hit with the regular inspector at Detroit for a period of 2 months, and a Nebraska State inspector is assisting on transit inspection at Omaha. The Easter shipping of both cut flowers and potted plants through Jacksonville, Fla., was described by the transit inspector as "probably the largest movement we have ever had through this station." At Kansas City, Omaha, and Council Bluffs the volume of Easter mail was the largest in the history of these stations, according to reports of transportation officials, and the express movement through Kansas City reached similar proportions. Narrative reports of the inspectors at each of the stations are being circularized among all the inspectors and are proving of value and interest to the men, many of whom are working alone. Better reports are also being sent in since this practice was put into effect.

Looking under the label.--While inspecting plant material arriving at Detroit for the flower show there March 23-31, transit inspectors found a shipment of 6 wooden boxes well plastered with labels reading "orchids." As the shipment came from an area heavily infested with Japanese beetles, the boxes were opened up to determine whether they might contain plants subject to restriction. One such box was found to contain 24 rooted plants in soil and without Japanese beetle certificates. At Saint Paul, another shipment without beetle certification was caught by the transit inspector. The interception of such shipments found far beyond the boundaries of the infested areas is considered, as one inspector puts it, "something to write about," in view of the possibility of infestation becoming established at outlying points.

Peach mosaic quarantine violations found.--Several shipments of plum stock, moving in violation of standard quarantines on the peach mosaic disease maintained by the infected States, have been found by the transit inspectors at Dallas and Memphis. Plant-pest-control officials of the States of origin and destination have been notified by telegram of these violations, for such action as the situation requires.

Progress in citrus canker inspection.--The force of 6 Bureau inspectors and 3 State men working in Louisiana in March inspected over 1,000,000 citrus trees on over 1,000 premises. Properties found infected in recent years in 9 Louisiana parishes were reinspected in March without finding citrus canker. No general tree-removal work is being conducted in Louisiana, but Citrus trifoliata trees found on or near properties previously infected are being destroyed by the inspectors. The white flowers on these trees, known locally as wild orange or wild lemon, make them easy to spot, even in thickly wooded areas. In Texas tree-removal and inspection work was conducted in Harris County in March.

CONTROL INVESTIGATIONS

Mixture of o-dichlorobenzene-naphthalene effective when applied in aerosol form.--W. N. Sullivan, E. R. McGovran, and J. H. Fales, in cooperation with L. D. Goodhue, of the Division of Insecticide Investigations, report promising results from applying these well-known insecticides in a new manner. In a preliminary test 80 cc. of a naphthalene-o-dichlorobenzene solution (0.3 gr/cc) was sprayed on a hot plate (temperature 175° C.) in a Peet-Grady chamber (216 cu. ft.) over an 8-minute period.

A dense smoke or fog was produced, containing among other particles minute crystals of naphthalene (?) seemingly in colloidal suspension in air. However, 3 hours after the test started there was no visual deposit resulting from this treatment. After a 24-hour-exposure period mortality was recorded and the insects were fed and held for a 4-day count. The insects were tested, and effectiveness of this treatment is given in the following table.

Test No.	Concentration used	Insect	Insects	Mortality in-- 1 day	Mortality in-- 4 days
			Number	Percent	Percent
1 a---	24 grs. in 80 cc. solution	Periplaneta americana (nymphs and adults)	160	77	100
1 b---	do.	Musca domestica (adults)	600	100	--
1 c---	do.	Tribolium confusum (adults)	249	100	--

The results indicate a practical control for roaches, houseflies, and flour beetles at a concentration of about 375 grams material per 1,000 cubic feet of fairly tightly enclosed space. As the cost of this treatment is roughly 10 cents per 1,000 cubic feet, and as the material is relatively nonpoisonous to humans but highly toxic to insects, relatively noninflammable, and has considerable penetrating power, it is believed that this method of treatment has possibilities for use under certain conditions.

INSECTICIDE INVESTIGATIONS

Cooperative testing of organic compounds.--The Bureau of Home Economics, mindful of the work being done in the Division of Insecticide Investigations with the preparation of a large number of organic compounds for testing against insects by cooperating entomologists, has requested that these compounds be made available to them for testing as mildew-proofing agents. According to a cooperative agreement, this will be done to as great an extent as is feasible with regard to cost and convenience of preparation. A somewhat similar arrangement is being made with the Public Health Service for making available to them numerous organic compounds for testing as possible remedies for trichinosis.

Survey of particle size of lead arsenates.--L. D. Goodhue has just had published in the Journal of Economic Entomologists (v. 33, No. 1, pp. 170-2, Feb. 1940) the results of an investigation of 16 brands of lead arsenate with regard to their relative fineness. The results were obtained by the sedimentation technique and hence reveal the distribution of sizes within each sample. Only 2 of the products contained more than 1 percent coarser than 40 microns diameter, but all but 1 showed appreciable quantities between 10 and 20 microns. The differences are perhaps best illustrated by stating that the proportion smaller than 1 micron diameter ranged from 10 to 60 percent by weight. It is evident that lead arsenate is in general a very finely divided material.

BEE CULTURE

Growth rate of queenbee greater than that of worker bee after early larval life.--R. M. Melampy, University, La., reports that queen and worker honeybees have the same approximate growth rate during early larval life, and then the growth of the worker is retarded, as shown by the nitrogen, total lipid, and total reducing substances (calculated as glucose), and calorific value. In certain studies the queens attained a maximum live weight of more than 260 mg. during development, whereas workers attained only 144 mg. The highest percentage of dry matter and the lowest percentage of water in the queens occurred at about the fifth day, although the absolute amounts of dry matter and water per individual insect were both at a maximum at this stage. The queens reached a maximum nitrogen content of 5.7 mg. per individual and the workers one of 2.1 mg. The highest total lipid content of the queen was 12.8 mg. per individual, whereas that of the worker was 5.4 mg. Total reducing substances reached their maximum on about the sixth day of development, the amount per queen being 13.2 mg. and that per worker 12.1 mg. The calorific value per gram of dry tissue of both castes increased during the larval period and decreased during the pupal stage. The ash content of the prepupal and pupal stages of the worker was approximately five times that of the queen. The two castes appear to be thresholds of development, owing to a difference in larval feeding, as both queens and workers have the same general gene complex.

Unanticipated difficulty experienced in inoculating colonies from untested stock with American foulbrood.--S. A. McGregor, Hope, Ark., reports: "The difficulty in getting bees inoculated with American foulbrood by a well-established method of inoculation constitutes one of the most interesting developments in work being conducted on bee disease resistance at Hope, Ark., by the Division of Bee Culture in cooperation with the University of Arkansas Fruit and Truck Branch Experiment Station. Ten times the minimum inoculation dose of 500,000 spores per cc. in a liter of sugar sirup, as established by A. P. Sturtevant, of the Intermountain Bee Culture Laboratory at Laramie, Wyo., was fed to colonies of bees under test at Hope. These colonies were headed by queens from 10 queen-breeders selected more or less at random from different parts of the United States and the queens had no past history of disease resistance. When disease failed to appear as expected in these colonies a second inoculation of 10 times the minimum inoculation dose was given about 4 weeks after the first one. A few of the colonies even received a third inoculation. Of 100 colonies established records of disease resistance were obtained on 85. The other 15 lost their queens and were discarded. Of these 85 the following records were obtained:

34, or 40 percent, showed no disease (negative)
51, or 60 percent, showed evidence of disease (positive)
41, or 48 percent, recovered from the disease (recovery)
75, or 88 percent, either showed no disease or recovered (negative plus recovery)
10, or 12 percent, failed to recover.

"These results are more startling when compared with data obtained at the Laramie Laboratory and the Iowa Experiment Station at Ames. At these two stations only strains of bees from parents showing a high degree of resistance to American foulbrood were tested. At Ames 90 percent of the colonies were either negative or recovered, and at Laramie only 67 percent of the colonies were either negative or recovered. A difference in strains was revealed at Hope, one strain showing only 1 cell of disease in 9 colonies tested, another strain showing disease in all 9 colonies tested, 3 of which failed to recover. All of the colonies receiving 3 inoculations either did not contract the disease or recovered. No reason for the high degree of resistance at Hope has as yet been found, but in 1940 another series of tests will be conducted nearby, but on a different type of soil to determine whether soil has any relation to the disease resistance."

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VOLUME VII

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR APRIL 1940

Vol. VII, No. 6 (Not for publication) June 1, 1940

ADMINISTRATION

Bureau Appropriations

The bill to provide appropriations to the Department for the fiscal year 1941 is still being considered by Congress. Certain parts of the bill are still in disagreement, including two items which provide funds to the Bureau, namely, Pink Bollworm and Thurberia Weevil Control, and the new item, White-fringed Beetle Control. The House has accepted the Conference Report on other items that relate to the work of the Bureau. The changes made from the amounts provided for the current fiscal year follow.

Fruit Insect Investigations-- Increase of $11,916 over the Budget estimate for investigations on insects affecting pecans in Georgia and Texas	$424,600
Mexican Fruitfly Control-- Increase of $7,500 but $7,500 below the Budget estimate	167,960
Dutch Elm Disease Eradication-- $100,000 below the Budget estimate and amount for current year	400,000
Forest Insects-- $40,200 below the Budget estimate and $40,600 below the amount for the current year	212,500
Truck Crop and Garden Insects-- The Budget estimate, which is $15,000 less than that available for current year	366,580
Cereal and Forage Insects-- Increase of $12,500 over the Budget estimate for investigations on Mormon crickets and grasshoppers. The Budget estimate provided a reduction of $16,700, involving reduction in certain work other than Mormon crickets and grasshoppers	379,500

Barberry Eradication-- $12,500 below the Budget estimate and $12,500 less than available for current year--------------	$162,500
Control Investigations-- Increase of $5,000 over the Budget estimate and amount for current year. This is for investigations on methyl bromide---------------------------	72,518
Insecticide and Fungicide Investigations-- $9,984 below the Budget estimate and amount available for current year------------------------	125,000

FRUIT INSECT INVESTIGATIONS

Petal-fall spray valuable in control of plum curculio on peach.--The value of the petal-fall application of lead arsenate spray for reducing the overwintered population of plum curculio adults in peach orchards is shown by jarring records reported by Oliver I. Snapp, of the peach-insect laboratory at Fort Valley, Ga. The following table gives the number of plum curculios caught on April 5 to 10, between petal-fall and shuck-off, each treatment being replicated 5 times in a Latin square arrangement of plats with areas 6 by 6 trees each.

Treatment	Total trees	Total plum curculios removed
	Number	Number
Lead-arsenate spray applied April 2--------------------	175	211
Lead arsenate omitted--------	174	494
Do---------------------	178	509

These results show that there were more than twice as many plum curculios on the trees that did not receive the petal-fall application of lead arsenate as on those that did receive this spray, and therefore substantiate the data in support of the petal-fall application in the spray schedule for the control of the plum curculio attacking peaches.

New parasite of raisin moth larvae.--Forty-six hibernating larvae of the raisin moth (*Ephestia figulilella* Greg.), taken on January 20 from grapevine bark near Orange Cove, Fresno County, Calif., by Dwight F. Barnes and George H. Kaloostian, of the Fresno laboratory, were incubated at about 80° F. When the records of emergence were concluded on February 29, 11 *E. figulilella* and 14 ichneumonid parasites had emerged. Of the latter, 11 were *Idechthis canescens* (Grav.), the commonest parasite of overwintering larvae of the raisin moth, and 3 were a new species of *Exochus*, determined by R. A. Cushman.

MEXICAN FRUITFLY CONTROL

Trapping continues as citrus harvest ends.--The 1939-40 harvesting season for citrus fruit in the area regulated under Quarantine 64 closed at midnight April 30. Very little commercial fruit remained in the area at that time to be harvested, and no inconvenience or loss was occasioned growers and packers because of the harvesting season ending on that date. Infestations of the Mexican fruitfly were general throughout the area late in April. Permits to harvest fruit for shipment were issued only after thorough inspections. Relatively few groves were found free of infestations and, as a result, facilities for sterilization at high temperatures were in general use. Traps continued to take adults wherever they were operated. Of the 793 females taken, 679 were gravid. At the close of the month some young flies were being trapped in the groves and some emergence was being noted in cages set over infested fruit.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Winter survival of sugarcane borer in sugarcane.--The coldest weather since 1899 occurred throughout the sugarcane-growing section during January. E. K. Bynum and W. E. Haley, of the Houma, La., laboratory, made examinations of sugarcane trash and stubs the last of February and during March to determine the number of borers surviving the winter. Results of trash examinations are given in the following table.

Year	Light soil				Heavy soil			
	10-ft. samples	Tops and pieces of cane examined	Live stages found	Estimated live stages per acre	10-ft. samples	Tops and pieces of cane examined	Live stages found	Estimated live stages per acre
	Number	Number	Number	Number	Number	Number	Number	Number
Cane trash burned:								
1940--	898	13,765	10	8	559	9,209	5	6.5
1939--	452	14,510	58	93	222	3,677	4	13.2
1936-38---	510	--	155	197	--	--	--	--
Cane trash not burned:								
1940--	240	9,493	48	144	--	--	--	--
1936-38---	443	--	544	870	--	--	--	--

From the examination of 3,710 stubs, it was estimated that 6.4 live borer stages per acre had overwintered in cane stubble, as compared with an average of 28.6 per acre for 1935-39. Sugarcane trash left on the field during harvest is the principal source of the spring borer infestation. Most of the trash is burned. From figures obtained during trash examinations, it was estimated that an average of 1,571 pounds of millable cane was left on the field at harvesttime. This indicates that growers would be justified in more carefully gathering this millable cane during harvesting operations, especially as this cane is the principal material in which borers hibernate.

Winter survival of sugarcane borer in rice.--W. A. Douglas, of the Crowley, La., laboratory, examined rice stubs from 15 fields to determine the mortality of borer larvae following the unusually cold weather of January. The results of these examinations are as follows.

Vicinity	Condition of field during winter	Stubs examined	Larvae found	
			Live	Dead
		Number	Number	Number
Crowley--------	Drained	500	7	18
Crowley--------	Flooded	500	0	6
Bayou Teche---	Drained	500	4	5

Very few rice fields are winter flooded. The mortality in the nonflooded fields was 68 percent. Sleet and snow, which covered the ground to a depth of about 1-1/4 inches at Crowley, may have afforded some protection to the borers in the lower part of the rice stubs and thereby decreased mortality. From the preceding figures, it was estimated that the number of borers surviving last winter in rice stubs in nonflooded fields was 42 percent of the number surviving an average winter.

Survey of borer infestation in sugarcane.--During the cane-harvesting season of 1939, J. W. Ingram, W. E. Haley, and L. J. Charpentier, of the Houma laboratory, made a survey of borer infestation in the sugar section of Louisiana. This survey consisted of determining the percentage of joints showing external evidence of boring, per 100 stalks of millable cane, in each of 4 representative fields on each of 10 plantations. Varieties examined were in proportion to the acreage occupied by them in the district represented by the plantation. Each plantation examined was representative of an area producing one-tenth of the total crop. An average of data obtained showed that 19.74 percent of the joints were bored, which is the highest infestation observed in several years. Average infestation percentages for Louisiana in past years were: 1938, 15.85; 1937, 16.05; 1936, 8.70; and 1935, 8.10.

Relation of early borer infestation to late infestation.--In a comparison of early and late-season borer infestations, Ralph Mathes and T. E. Holloway, of the Houma laboratory, made examinations for borer-killed dead hearts (tops of young plants) in stubble cane in each of three variety test fields of the Bureau of Plant Industry in May and again in June 1939. Examinations for percentages of joints bored were repeated in these same test fields when they were harvested. In each examination for dead hearts, 180 row feet were examined in each of 6 replications of each variety at each test field, or a total of 3,240 row feet were examined for dead hearts. The percentages of joints bored at harvest are based on examinations of 15 stalks in each of 6 replications of each variety, or a total of 90 stalks of each variety in each test field. Total numbers of dead hearts caused by borers and average percentages of joints bored at harvest on the 3 plantations are as follows.

Variety	Total dead hearts	Average joints bored
	Number	Percent
C.P. 29/116	835	37.5
C.P. 29/320	485	28.9
C.P. 28/19	287	22.5
Co. 281	279	29.9
Co. 290	205	26.3
C.P. 28/11	163	25.4
Average	376	28.4

It may be seen that harvesttime injury was in general proportion to spring injury for all varieties, except that C.P. 28/19 and Co. 281 are considerably out of line.

Adult Phyllophaga of brood C ready to emerge.--T. R. Chamberlin, Madison, Wis., reports that diggings in southern Wisconsin showed that most of the adult June beetles of the "C brood" were in or near the sod at the middle of April and many were uncovered by plowing in the Lamont district. None was observed in flight or taken in bait traps during the month, but there had been much cold weather with snow. In mid-April most of the grubs were still deep in the soil, but a few were found in the sod in the higher portions of a pasture with southern exposure. On north slopes ice crystals were still present around the roots of some plants at the 20-inch depth.

JAPANESE BEETLE CONTROL

Spring nursery shipping season.--In the Westerly, R. I., area, a comparison of quantities of plant material inspected and the number of certificates issued shows a large increase in this April over April 1939. Nursery shipments also increased considerably in the New Haven, Conn., district. Improved weather conditions in the New York City area during the latter part of April resulted in an increase in the number of inspections and certifications. During the month some 18 carloads of large nursery stock were shipped under certification from the Long Island area. The increased volume of inspection work on Long Island resulted in the reassignment of 1 New York City office inspector to assist the 2 inspectors who are regularly assigned to Long Island. In New Jersey methyl bromide fumigation of nursery stock has been outstanding during the month, 11 fumigation chambers being in use. These were responsible for an increase of approximately 100 percent in the number of plants treated, as compared with those treated by various chemical means in April 1939. Records show that 86,620 plants were fumigated in New Jersey this month as against 43,627 a year ago. This month 11,587 azaleas and rhododendrons were treated with paradichlorobenzene, as compared with 1,712 plants similarly treated in April of last year. A New Jersey nurseryman used his fumigation chamber to fumigate winter clothing that he was packing away for summer storage.

About 87 carloads of nursery stock were shipped by New Jersey nurserymen during April. New Jersey nursery establishments in many instances are reported as having exhausted their supply of medium-to-large-sized stock. In some cases stock has been brought in from the mid-Western and New England States to fill orders. Extensive plantings of young stock have been observed throughout the State. The shipping season for deciduous stock was about finished at the end of April. There are now 34 methyl bromide fumigation chambers in use through the Japanese beetle regulated area. These have a total capacity of 11,736 cubic feet. The largest is 2,000 cubic feet and the smallest 50 cubic feet. A total of 177,646 plants was fumigated during April. Four additional nurseries are contemplating building chambers in the near future. A report from the Pittsburgh district office states that not until the middle and latter parts of April did evergreen and other balled stock begin to pour into that area by carload and motortruck. Then business increased to the extent that extra seasonal help was added to take care of increased sales. It is anticipated that this year will see an increase over the estimated 200 carloads of material sold in the Pittsburgh area last year. During April 32 carloads of nursery stock were shipped from the Salisbury, Md., area. At one of the packing houses inspectors worked in shifts while millions of strawberry plants and numerous orders of cane stock were being shipped. On several occasions it was necessary for 1 or 2 inspectors to work until after midnight. A large nursery at Towson, Md., reports that to date more shipments have been made than in 1939.

Water seal simplifies construction of fumigation chamber.--A number of difficulties were encountered in the construction of an airtight fumigation chamber at one of the large northern New Jersey nurseries. The most difficult feature was to construct and make tight an exhaust trap door for the ventilating system. Upon the suggestion of one of the members of the treating section, the nursery constructed a water-seal door that has proved satisfactory. Tests made in small chambers that can be made very airtight have shown that the heat and gas expansion in the box during the fumigation process exert only a 1 mm. mercury pressure. This is about equal in weight to a ½-inch column of water, so that an all-around seal of 1½ to 2 inches of water is sufficient to hold the gas in all commercial chambers. The use of the water seal simplified the construction and made the seal positive, eliminating the use of halide detectors for checking the opening. The only checking necessary is to see that the water channel is filled before fumigation begins. This same type of seal can also be adapted for fresh air intakes.

Revision of Japanese beetle quarantine regulations.--Effective April 5 the Japanese beetle regulated area was extended to include additional territory in Maryland, New York, Ohio, Pennsylvania, and West Virginia. The area of continuous infestation from which the movement of fruits and vegetables by refrigerator car and motortruck is restricted was also extended to include New York City and surrounding area, together with additional extensions in Maryland, New Jersey, and Pennsylvania. To take care of early emergence of adults on the Eastern Shore of Virginia, the season during which inspection and certification of produce is required from certain parts of this area was advanced to June 1 instead of June 15. In the Departmental news release announcing this revision of the regulations, announcement was made of a decision to continue the Japanese beetle quarantine. This matter had been discussed by nurserymen and plant-quarantine officials from 18 States and Canada at a public conference held in Washington on February 27.

"Balled and cottoned" nursery stock.--War conditions have prevented the importation of Dutch and other burlap used in large quantities by nurserymen. This shortage has given the southern cotton mills an opportunity to cover the shortages with present and new types of cotton fabrics. New Jersey nurseries have been using heavy cheesecloth and even onion sacks where wide-mesh burlaps have previously been used. To meet a scarcity of German peat, a South Jersey dahlia grower is substituting for a packing material a combination of corn and oats chaff and chopped oats straw. This makes a light, fluffy material.

Beetle-proof greenhouse invaded by frightened deer.--Early this spring a frightened deer jumped through the glass of a certified greenhouse owned by a Columbia County, Pa., grower. After running up and down the beds of sweet peas and potted plants, the deer jumped out through the glass on the opposite side of the house. To prevent a recurrence of this episode, this grower recently constructed a greenhouse 100 x 13 feet in which all of the glass used was taken from the windshields and doors of junked automobiles. All glass was procured from one junk yard.

Spruce tree inspected for President Roosevelt.--During the month an inspection request was received at the New York City office from the estate of Mrs. James Roosevelt, Hyde Park, N. Y. President Roosevelt wished to ship a spruce tree to California. Certification was granted after the original soil on the tree had been washed off and replaced with sterilized soil obtained from a classified nurseryman.

Soil sampling reduced.--Collection and analyses of soil samples from nursery plots, heeling-in areas and frames began in April and will be completed by the middle of May. There will be a reduction in the number of nursery units to be sampled, particularly in the heeling-in areas and frames.

Temporary inspectors added to New England force.--Thirty-three temporary inspectors were employed in connection with the inspection of nursery products in the New England States during April. The duration of employment varied with the location of the nursery and the date when digging operations began. Owing to snow, cold weather, and an unusual amount of frost in the ground, New England nurseries were unable to begin digging until April 1. This is the first season on record that digging has been so long delayed over the entire New England area. In Rhode Island and Connecticut digging operations began on April 5; in New Hampshire on April 8; in Massachusetts on April 10; in Vermont on April 17; and in Maine on April 27. Two temporary inspectors were employed in Rhode Island, 18 in Connecticut, 4 in Massachusetts, and 9 in Maine. The 9 inspectors in Maine were located at a forest nursery where there are over 2,000,000 trees to be inspected for shipment to points outside the gypsy moth regulated area. At a nursery in Cromwell, Conn., 4,298 balled and burlapped evergreens were fumigated with methyl bromide for shipment to points outside the Japanese beetle regulated area. Prior to their fumigation each evergreen had been examined for gypsy moth infestation. At a nursery in Manchester, Conn., 46,448 miscellaneous plants were fumigated. It was also necessary to inspect many individual shrubs and evergreens destined to points outside the gypsy moth regulated zone.

Gypsy moth infested shipments.--Of 72 gypsy moth egg clusters removed by inspectors during the month of April, 9 were taken from 9 shipments of nursery stock destined to Connecticut, Indiana, New York, Pennsylvania, and Vermont. The remaining 63 egg clusters were removed from 8 carloads and 4 truckloads of lumber.

Analysis of relative scouting performance in 1939.--As a basis for individual reemployment and for selecting new Dutch elm disease scouts to be paid from Departmental funds in 1940, the performances of scouts employed in 1939 have been tabulated. Over 6,000 men filed applications and approximately 5,000 were offered jobs. Only 2,251 accepted. Only 1,647 successfully completed scout training and only 1,394 made satisfactory scouts during the summer. From 75 to 100 percent of the men from the States of Illinois, Kentucky, Maryland, Massachusetts, Michigan, Rhode Island, Tennessee, and West Virginia made satisfactory scouts. Only about 50 percent of the men from the New York City metropolitan area graded as satisfactory. The average for all States was 62 percent satisfactory scouts. Men were obtained from 196 colleges. Of these colleges, 12 furnished 10 or more men, at least 75 percent of whom made satisfactory records. Of the 11 colleges in the major work area, none was among these 12. From general observation it appeared that farm-reared men were slightly more adaptable to Dutch elm disease scouting than were city-reared men. Of the men who made satisfactory scouts, college men made an average rating of 86.9 at the end of 2 months' work as scouts. Those who had an average of 2 years' and 3 months' experience, mostly as W. P. A. workers on the project, made an average rating of 87.6. Two conditions definitely contributed to an excessively large number of failures to report and a large number of failures in scout training. First, some college officials and employment agencies supplied the names of men who could not meet the physical and financial requirements and who apparently never seriously considered taking the job. Second, because of the short time available, the list of selected men was soon exhausted and any qualified man who applied was accepted. Many of these had no real interest in the work and, because they were near home, quit the job as soon as the training became too tough. Including the satisfactory scouts employed on W. P. A. in 1939 and no longer employable on W. P. A. funds, there should be available about 1,500 well qualified men who can be employed on regular funds this summer. Probably an additional 500 men who made fair scouts in 1939 can be reemployed. This will eliminate the need for extensive scout training this summer and should make available a highly satisfactory force at the beginning of the season.

Floods interfere with Dutch elm disease eradication.--In Pennsylvania a continuous rain on the week end of March 30 caused a rapid rise of the Delaware and Lehigh Rivers to the flood stage. Four of five elm bark beetle traps placed in the areas along the Delaware River in Monroe and Pike Counties were washed away. Later in the month flood conditions along the Ohio River closed all roads leaving Athens, Ohio, where elm-sanitation work is in progress. The city was completely isolated from April 19 to 23. Flood conditions were claimed to be the worst in that vicinity since 1913. A large percentage of the employees were unable to reach Athens to report for work during the latter part of that week. The scouting location could not be reached and burning was resorted to temporarily by the workers.

Bark-beetle brood galleries in green elm.--Examination of a confirmed tree in North Branford Town, New Haven County, Conn., disclosed an interesting condition, in that the tree was heavily infested with larvae of Scolytus multistriatus Marsh. in the crown and upper trunk. Adult Scolytus had entered the green lower trunk in large numbers during the last season. The larvae had hatched and started their galleries but apparently had died after completing about ½ inch of the gallery. This apparently is the first case found in the Connecticut area where any of the brood galleries appear in green wood, as in all other cases observed the adult had penetrated to the live sapwood and then backed out.

Fire regulations hamper burning of elm wood.--In Connecticut several district fire wardens refused to grant permission for any burning of wood or brush during the months of April and May. This condition was brought to the attention of the assistant State fire warden, who worked out satisfactory arrangements whereby permission will be granted for the burning of wood, except on extremely hazardous days, as reported by the Weather Bureau and announcements over the radio.

First-record infection in Philadelphia County, Pa.--A first-record infection was reported from Philadelphia County, Pa., during the week of April 20. This tree, with a d.b.h. of 42 inches, was located on State property approximately 550 feet west of U. S. Route 1, just south of Poquessing Creek, which forms the northern boundary of Ward 35, Philadelphia County, and the southern boundary of Bensalem Township, Bucks County.

First-aid courses for eradication supervisors and foremen.--First-aid courses were in progress during April in Westchester, Putnam, Ulster, and Orange Counties, N. Y. Reports from the various counties indicate that attendance was good and keen interest was manifest in the courses. Similar courses were also offered in Connecticut, New Jersey, and Pennsylvania.

FOREST INSECT INVESTIGATIONS

List of insects associated with elm being compiled.--Before being transferred to the Asheville, N. C., laboratory from the Morristown, N. J., laboratory on April 16, C. H. Hoffman submitted a manuscript entitled, "An Annotated List of Elm Insects." It is based on records found in the different files of the Bureau of Entomology and Plant Quarantine and those gleaned from available entomological literature. Only those species thought to be intimately associated with elm through breeding, feeding, ovipositing, or hibernating have been included. The list includes 591 species belonging to 438 genera, 123 families, and 11 orders. The order Coleoptera leads in the number of species represented. In this order there are 46 species of Cerambycidae, 35 Scarabaeidae, 28 Scolytidae, and 24 Curculionidae. Among the Lepidoptera there are 20 species of Geometridae and 17 species of Noctuidae. The Hymenoptera are mostly parasites of bark beetles and borers. There are 25 species of Braconidae and 22 species of Ichneumonidae. Fifty species of Coccidae and 17 species of Aphiidae are included in the order Homoptera.

Forest tent caterpillar outbreak practically at an end.--J. V. Schaffner, Jr., New Haven, Conn., reports that a series of sample plots in Vermont and western Massachusetts, where observations have been made throughout the outbreak, were visited this spring to obtain data on the 1939 egg deposit. Because of the difficulty in making accurate counts of egg clusters in a limited time at each point, the number of egg clusters collected and actual time spent were recorded. This, of course, does not give definite data on the existing population but, taken over a period of years, it shows the trend of infestation. Below are listed the collection points and the rate per hour that egg clusters were collected for the years 1936 to 1939, inclusive. (The years in which eggs were deposited are listed, although the collections were made the following spring.)

Town	Type of plot	Egg clusters collected per hour in--			
		1936	1937	1938	1939
Massachusetts:					
Williamstown	Shade trees	--	154	72	20
Vermont:					
Barre	Shade trees	2/--	--	98	1/ 6
Bennington	Sugar orchard	61	97	16	0
Bridport	Shade trees	86	49	(3)	--
Bristol	do.	37	29	16	0
Danby	Sugar orchard	82	38	12	0
Dorset	do.	--	46	14	0
Dorset	Mixed hardwoods	2/--	58	38	5
Pawlet	Sugar orchard	2/49	29	38	11
Randolph	do.	2/52	72	26	5
Richmond	Shade trees	2/ 5	8	0	0
Springfield	Mixed hardwoods	2/54	40	28	15
West Rutland	Sugar orchard	2/55	79	26	4

1/ Some of the trees sprayed in 1939.

2/ Some trees severely defoliated prior to 1936.

3/ Trees were sprayed in 1938.

An examination of the above table shows that there was a general decline in the infestation for most of the sample plots in 1938 and a very definite decrease in 1939.

Pine plantations sprayed for control of white pine weevil.--S. F. Potts, New Haven, Conn., reports that over 30 acres of white pine in New York, ranging from 6 to 14 feet in height, were treated with concentrated sprays for the control of the white pine weevil during the latter part of April. This work was conducted in cooperation with the New York Conservation Department. The concentrated spray consisted, by weight, of 1 part lead arsenate, 10 parts water, 0.3 part linseed oil, and 0.03 part aresket. It was applied at the rate of 4 to 6 gallons per acre, using ordinary knapsack sprayers, each equipped with a special type of extension rod and solid-cone-type nozzle for atomizing concentrated spray. The treatment cost about $2 per acre for materials, labor, and equipment. Previous experiments have shown that excellent control of the weevil may be obtained by this method. As thousands of acres of young white pine and Norway spruce are threatened with virtual ruin by this weevil, it is felt that this method of control should have a rather wide application.

Parasite of European spruce sawfly reared in laboratory.--Frank E. Miller, Jr., a collaborator at New Haven, Conn., reports that a series of 76 pairs of Microcryptus basizonius Grav., an imported parasite of Diprion simile Htg., were studied in the laboratory as parasites of the European spruce sawfly (Gilpinia polytoma (Htg.)). Data obtained on the length of life of each female and the number of eggs deposited, as well as the sex ratio of the progeny, indicate that the rearing of the species in the laboratory is practical. The 76 females lived a total of 1,819 days, an average of 24 days per female, and deposited an average of 22 eggs per female, or a total of 1,689 eggs during the period. The 1,689 eggs were all laid during 1,047 of the 1,819 days, however, giving an average daily egg production per female of 1.62 eggs per oviposition day. The total number of eggs laid per female ranged from 1 to 56, with an average of 22. The preoviposition period ranged from 1 to 12 days. The average female began laying eggs on the fifth day. The postoviposition period was much longer, several females living more than 20 days after completion of egg laying. The average period of oviposition was 14 days, but the period ranged from 1 to 30 days. In general, oviposition was continuous, 43 of the females laying their complete series of eggs uninterruptedly and 33 of the females laying their eggs with interruptions of 2 to 8 days at a time. The oviposition period was considered as the elapsed time between the deposition of the first egg and the last. In the 3 generations of Microcryptus reared in the laboratory this year the sex ratio has ranged from the normal 1:1 to an excess of males averaging less than 5 percent. Samples of the progeny of the 76 females studied in the above experimental work have yielded 130 females and 134 males.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Conditions affecting gypsy moth work in New England.--The thawing of the roadbeds developed frost heaves on hard-surfaced roads and serious mud conditions on dirt roads, which necessitated extra precautions in automobile driving. Many crews were obliged to walk long distances from the nearest point that could be reached by automobile to the scenes of their work. In general, satisfactory progress was made in all departments of gypsy moth work during April.

Scouting and clean-up work nearing completion in several Vermont areas.--An additional infestation consisting of one gypsy moth egg cluster was located in Bristol Township, Addison County, Vt. No further egg clusters were found, although intensive scouting of trees and careful examination of ground debris was performed in an area of considerable radius around the point where the egg cluster was discovered. Bristol is located approximately in the center of the Vermont section of the barrier zone. During the first part of April conditions were such at this and other infested sites in Vermont that ground work could be conducted without interference from snow. Every effort was exerted to complete the work at these infestations so that the trash wood and brush could be burned before the ground litter became so dry that the building of fires would be dangerous, and also to complete the scouting of areas around sites where assembling cages had attracted moths last summer. Several of the gypsy moth infestations found in Vermont during the past winter were located in small hardwood growth where thinning work has since been completed and in which the problem of eradicating the insect has been simplified. Scouting work in the township of Jericho, Chittenden County, was completed in April with no discovery of any indication of the presence of the gypsy moth, and the crew began scouting along the banks of the Winooski River, which flows through Richmond Township.

Conditions favor extermination of newly found infestation.--A gypsy moth infestation consisting of about 50 egg clusters was found in April in a high and exposed location on Clarksburg Mountain, Clarksburg Township, Berkshire County, Mass. The center of the infestation is located in scrubby hardwood growth which is so exposed that wind spread into a rugged and extensive tract of forest nearby might be reasonably expected, with the proper combination of conditions immediately following the hatching of the small caterpillars. However, the infestation is accessible, and this and other propitious circumstances appear to favor the extermination of the colony by spraying with lead arsenate at the proper time.

Autogiro nearly ready for aerial attack on gypsy moth.--The reconditioning and assembly of the autogiro owned by this activity, which has been completely overhauled during the past winter at the repair shop in Greenfield, Mass., is progressing satisfactorily. This machine is used for aerial observation in the gypsy moth infested area, and for the distribution of arsenical insecticide from the air.

Gypsy moth infestation in residential area apparently eradicated.--Upon receipt of a report that 2 gypsy moth egg clusters had been found in a residential section of New Haven, Conn., a small crew of agents was detailed to scout the neighborhood. These men found and destroyed 23 new egg clusters, several of which had been deposited on privet hedges and other ornamental shrubs and the remainder were located on nearby shade trees. Although a wide area around the center of infestation was closely examined, no further evidence of the insect was found. As a precautionary measure the infested area will be sprayed early in June.

Tree climbers busy at heavy infestation.--At the severe gypsy moth infestation in Southbury, Conn., a crew of men continued to climb trees in order to remove broken branches and trim off splintered stubs resulting from a severe ice storm which did much damage along the Connecticut coastal area early in March. As the shattered branches provide ideal situations for the deposition of gypsy moth egg clusters which are difficult to locate, their removal will simplify the scouting of this area after the next adult season. Scouting work was recently begun in the adjoining town of Roxbury to determine the extent of the spread of the infestation in that town from the Southbury infestation. Several egg clusters have already been found and creosoted in Roxbury.

Planned gypsy moth scouting in Pennsylvania nears completion.--The approved plan of gypsy moth scouting work for the current fiscal year is rapidly approaching completion in the Pennsylvania area, despite supplementary additional work made necessary because of infestations discovered in the vicinity of assembling cages that attracted male gypsy moths last summer. A small infestation that covered approximately 2 acres was located in Mauch Chunk Township about the middle of April in the vicinity of two assembling-cage sites where male moths were taken last season. Field conditions in the Pennsylvania area had improved to such an extent by the middle of April that all types of gypsy moth work could be conducted without interference from snow. The forests had become very dry, and it was necessary to discontinue burning brush, except for a few hours immediately following rain. Considerable supplemental ground work was done at infestations found when the ground was covered with snow, and additional egg clusters were located and destroyed.

Gypsy moth inspection work increases in Pennsylvania.--Mild weather in Pennsylvania enabled the nursery dealers and collectors to begin digging wild plants and shrubs by the middle of April. The movement of kalmia and rhododendron plants, which are abundant in the area infested by the gypsy moth, was particularly marked. This, together with a large increase in the amount of scrap metal received at junk yards within the quarantined area, added materially to the inspection work in that section.

Experienced men obtain spraying permits in Pennsylvania.--Picked men selected for their long experience in gypsy moth work were detailed early in April to the work of obtaining spraying permits from property owners in the settled communities in Pennsylvania where gypsy moth spraying will be necessary during the coming season. The property owners have observed the decided benefits derived from spraying and appreciate this phase of the work more than they did when gypsy moth eradication work was first started in Pennsylvania several years ago, and few objections to the spraying work are now encountered. Approximately 1,500 permits, most of them needed for the planned spraying work this year, had been obtained by the end of April.

Report of C. C. C. gypsy moth work for three-quarters of fiscal year.--The report of C. C. C. gypsy moth for the first 9 months of the fiscal year 1940, which ended on March 31, shows that 47,081 6-hour man-days were used in gypsy moth work east of the barrier zone under the supervision of this Bureau. This resulted in the examination of 79,883 acres, 3,817 of which received intensive creosoting work and 1,336 acres were selectively thinned. During the course of this work, 1,226,146 gypsy moth egg clusters were destroyed by burning and creosoting.

C. C. C. gypsy moth work increases during April.--Time spent on gypsy moth work done by C. C. C. enrollees under the supervision of this Bureau in the territory east of the barrier zone increased during April from 1,419 6-hour man-days during the first week to approximately 2,000 man-days during the week ended April 27, despite various interruptions. Considerable time was lost because of stormy weather, the training of gypsy moth crews in fire-fighting work, and the retaining of some of the men in the camps for dental work. Some plans of work were necessarily modified so that the crews could work within call if needed for fire fighting. All C. C. C. enrollees are required to undergo a thorough physical examination before becoming eligible for fire fighting, and all of the enrollees in one camp who failed to pass the physical examination, or who were below the age limit for fire fighting, were placed in one large crew and assigned to gypsy moth work. Although 1 camp in Massachusetts was removed from gypsy moth work, this loss was offset by the return to gypsy moth work of another camp that has been engaged in forest-fire-hazard-reduction work much of the time since the hurricane. The work of the C. C. C. gypsy moth crews consisted of scouting, creosoting egg clusters, burning brush and debris, and selective-thinning work. Emphasis was placed on rapid scouting to locate concentrations of infestations for ground spraying work in Massachusetts and Connecticut, and numerous suitable areas were found where scattered infestations of large egg clusters were present. In contrast to the scattered infestations in these 2 States, large areas were found in the town of Rockingham, Windham County, Vt., and vicinity where the infestation is very heavy and concentrated, and where approximately 272,000 gypsy moth egg clusters have been destroyed so far this season.

Preparations made for C. C. C. gypsy moth spraying.--Arrangements have been made for this Bureau to loan nine spraying machines for C. C. C. spraying work in Massachusetts and Connecticut this year. The machines will be operated 12 hours per day on a double-shift basis in Connecticut, but the machines in Massachusetts will operate on a single-shift basis because of the lack of sufficient man-power and supervision for a double shift. Arrangements were also made with the gypsy moth division of the State Entomologist's office in Connecticut to use a considerable portion of the State organization to assist in the C. C. C. spraying work east of the barrier zone in that State, and for the use of State-owned spraying equipment. The C. C. C. has purchased approximately 31 tons of lead arsenate and 1,787 gallons of fish oil for the work in Connecticut, and 8 tons of lead arsenate and about 500 gallons of fish oil for use in Massachusetts.

Private gypsy moth control work encouraged by the C. C. C.--Contacts with C. C. C. foremen in charge of gypsy moth work have been influential in making clear to several woodland owners the advantages of private gypsy moth control work on their properties. The foremen have encouraged the owners to do various types of work and occasionally have advised them as to the proper procedures. As a result, one property owner has employed several men throughout the winter in creosoting gypsy moth egg clusters; another has performed selective thinning work all winter to reduce the susceptibility of his woodland stand to gypsy moth increase; and still another owner has agreed to plant pine trees, which are not favored food plants of the gypsy moth, in an area where a C. C. C. gypsy moth crew had made a clear cutting of growth particularly favorable to gypsy moth development. Another instance of cooperation occurred when the cordwood cut on city property by the C. C. C. in the course of thinning operations was taken by the city and delivered to needy citizens.

PLANT DISEASE CONTROL

Studies on preservation of flowers and fruits.--Clarence R. Quick, of the Berkeley, Calif., blister rust office, recently summarized data on a series of tests initiated in 1935 on the preservation of the form and color of flowers, fruits, and leaves. These studies were undertaken at the request of personnel responsible for the handling of educational material, who expressed a desire to improve preservative solutions for Ribes and pine specimens. In 1935, 17 solutions were prepared and tested as preservatives of the form and color of sundry flowers and fruits, and 7 of the more satisfactory of these solutions were retained from this first series, and the tubes containing preservative and plant specimens were stored for 5 years. In March 1936, 18 preservative solutions were prepared and tested on leaves and fruits of R. californicum and on the flowers of 10 species of Ribes. After 4 to 5 years of storage in the various preservatives, the colors of green leaves, and several typical colors of flowers and fruits were, as a group, best preserved in a solution that contained copper sulfate, sucrose, formaldehyde, ethyl alcohol, and boric acid. Copper sulfate appeared particularly valuable in preserving the green color of leaves. On the basis of these tests, 100 cc. of the best all-purpose single-solution preservative contained: 6 cc. formaldehyde (40%), 25 cc. boric acid (4%), 4 cc. copper sulfate pentahydrate (10%), 4 cc. ethyl alcohol (95%), and 61 cc. water, in addition to 10 grams of sugar.

Phenological notes from the Southern Appalachians.--In the Southern Appalachian States leafing out of the Ribes bushes was greatly delayed by the cold weather in April. Freezing weather occurred in all seven States in the region as late as April 12. Skunk currants in the mountains of Green County, Tenn., had very small leaves on April 24. In Raleigh County, W. Va., as late as April 28 some gooseberries were found in dormant condition, although small leaves were seen on a few bushes. The aecial pustules of the blister rust were in considerable evidence in Virginia and Maryland, the first to be reported as open being on April 4 in Augusta and Rockingham Counties, Va. As late as May 3 they were noticed in abundance in Garrett County, Md., at Deep Creek Lake Dam. A photographer from Georgia visited these areas early in May to take colored motion pictures of blister rust damage to pine and to show the different stages of fungus development on pine.

Ribes hybrid found growing in Wisconsin.--Ribes fasciculatum, a Ribes heretofore not reported in Wisconsin, was found growing in Grant Park in Milwaukee. The plant appears to be a hybrid, apparently the ornamental alpinum crossed with japonicum. The fasciculatum plants found were apparently the variety chinense Maxim. A specimen of this hybrid was taken to the Milwaukee blister rust office. The buds were just beginning to break on the plant. A characteristic of this hybrid is the fact that it carries its fruit on the main stems and the fruits are held over winter. The fruits remain reddish color throughout the winter, making the plant desirable for ornamental use and it would also seem desirable as winter food for wildlife. This Ribes was found to be susceptible to blister rust by Spaulding in his inoculation tests of Ribes species (U.S.Dept. Agr. Bull. 957, p. 19).

Inspection in West Virginia shows excellent Ribes-eradication work.--R. G. Pierce reports that a recent inspection of a blister rust control area near Watoga State Park in Pocahontas County, W. Va., initially cleared of Ribes in the winter of 1933 by C. C. C. workers and "mopped up" in 1934 by P. W. A. employees and possibly once since but not later than the spring of 1937, revealed not a single Ribes bush. A similar inspection of an area at Skelton, W. Va., worked first by P. W. A. employees in 1934 and reworked by

C. C. C. men in 1939, revealed but six Ribes bushes in $4\frac{1}{2}$ hours' search on April 28. The 1934 Ribes were still visible where they were hung in crotches of trees and could be distinguished easily from the 1939 eradicated bushes. In the latter year only a few bushes were found per acre, as compared to the larger number found in 1934. These two areas show excellent Ribes-eradication work.

Blister rust cankers on sugar pine.--The Office of Forest Pathology in San Francisco reported the finding of two incipient blister rust cankers on sugar pine at Montgomery Creek, in northern California, the site of the abundant Ribes infections discovered in 1938. W. V. Benedict and C. P. Wessela, of the Sugar Pine Region, during the last week in April, found a single incipient canker, also on sugar pine, on the easternmost control unit in the Klamath National Forest. The discovery was made in the drainage of Beaver Creek a few miles south of the Oregon line.

Rust infection on barberries reported from five States.--Barberry bushes became infected with stem rust in Virginia, West Virginia, and Illinois about April 25, and some infection was reported from Colorado and Iowa between that date and May 10. Generally speaking, infection this year is a little later than usual, apparently owing to cold and otherwise unfavorable weather, except in Illinois, where infection was observed on barberries on April 25, whereas May 2 is an average date. E. C. Stakman, in charge of rust surveys for the Division, reports that during the last week of April light infection of stem rust was observed in Texas as far north as the Dallas area. There appeared, at that time, little prospect of any damaging increase in any of the areas inspected, except for a section northeast of Dallas where crop growth is rank. According to I. M. Atkins, of the Bureau of Plant Industry, a light infection of stem rust, consisting mainly of single pustules, was observed in the area between Cleburn, which is southwest of Fort Worth, and McKinney, northeast of Dallas. Wheat development at that time ranged from heading to flower in the Fredericksburg-Johnson City section north of San Antonio. This is about normal development.

Field operations expanded in Colorado during April.--According to E. A. Lungren, in charge of barberry eradication in Colorado and Wyoming, 81 men were employed on control work in the San Juan Basin during the last pay period in April. Further expansion was to begin on May 1, when crews were requisitioned in La Plata and Montezuma Counties. For the next 2 to 3 months, men employed on the F. A. project in these counties will be assigned to recheck work. The following table shows the number of workers, by counties, employed in Colorado as of May 1.

County		Workers				
	Supervisors	Skilled	Intermed.	Unskilled	Supervisors	Unskilled workers
	Number	Number	Number	Number	Number	Number
F. A. Project:					State Project:	
Archuleta	1	3	0	27	0	0
Boulder	1	0	0	9	0	0
Costilla	1	0	0	22	0	0
Dolores	0	1	0	5	0	0
La Plata	1	3	1	11	1	21
Montezuma	0	1	0	8	0	0
Total	4	8	1	82	1	21

Fewer rust epidemics in Ohio in recent years.--When barberry eradication was undertaken in Ohio in 1918, grain crops were being damaged by stem rust to the extent of 851,000 bushels annually (5-year average, 1918-22). The eradication of more than 3,249,700 bushes since that time has brought about a steady decrease in losses from this cause. During the 5-year period 1935-39 the average annual loss was 235,000 bushels. Harry Atwood, State leader of barberry eradication in Ohio, comments on the frequency with which local epidemics of stem rust are encountered in Ohio, as follows: "During the early years of control work inspectors were confronted with stories, told by farmers, concerning the destructive character of the common barberry in their respective communities. An investigation usually confirmed the fact that the rust was actually present in quantities on the growing grain. The varying degree of rust severity in different parts of the infected fields was so evident that it was a simple matter to find the guilty barberries. Repeated observations were made during the growing season and maps prepared from the data obtained. These illustrated the progressive development of stem rust, the first appearance of rust on barberries; the date the first red rust appeared on nearby grains and grasses; the date that black rust first appeared; the rate of spread; and the severity of the rust at harvest time, including an estimate of the damage caused. The date upon which the first rust infection was found on barberry bushes in Ohio has ranged during the past 20 years from April 7 to May 10, and the date upon which rust was first found on grains and grasses during the same period has ranged from May 30 to June 15. These variations apparently are due primarily to weather conditions. In addition to preparing a detailed map, a case history of each local rust spread is prepared. The case history includes the location of the spread, the farmer's story of local rust outbreaks, history of the barberry location, comparison of yields and quality of grain produced in the same fields in the years before and after the barberries were removed, and the names and addresses of interested farmers in the community. These local epidemics have reached varying degrees of severity and extent. In one county alone, in a single year, losses from stem rust amounted to more than $50,000. The damage ranged from complete destruction of crops near barberry bushes to reduced yields and grain of poor quality in other parts of the county. As the barberry population has been reduced in the more important grain-growing areas of the State, fewer local epidemics of stem rust are encountered. A general light sprinkling of stem rust may be found in many wheatfields almost every year. This light sprinkling occurs late in the growing season and seldom does any damage. This may be caused by spores blown from the South, either directly from barberries or from rusted grain fields."

COTTON INSECT INVESTIGATIONS

Plot studies for cotton-insect control.--During the last several years workers engaged in making insecticide tests for control of several cotton insects have been using various-sized plots arranged in two different designs, namely, randomized blocks and Latin squares. It has been customary for the data collected on insect infestations and yields to be analyzed by the method of analysis of variance. Comparisons have been made of the criteria for evaluating an insecticide, plot designs, sizes of plots, and the experimental errors found, for the purpose of determining, if possible, the most desirable to use in future experiments. These data have been compiled by R. C. Gaines from published and unpublished reports of the experiments conducted by F. F. Bondy and C. F. Rainwater at Florence, S. C.; by C. S. Rude at Gainesville, Fla.; by R. L. McGarr at State College, Miss.; by R. C. Gaines and M. T. Young at Tallulah, La.; by K. P. Ewing at Port Lavaca and Waco, Tex.; by J. C. Gaines and R. W. Moreland at College Station, Tex. (in cooperation with the Texas Agricultural Experiment Station); and by T. P. Cassidy at Mesa, Ariz. The unit of measurement for boll weevil infestation was the average percentage of squares punctured per plot. After treatments were begun, records of percentages of squares punctured were made at regular 5- to 7-day intervals. These records were averaged. Yield was the number of pounds of seed cotton produced per plot. The boll weevil infestations and yields were used in the analysis of variance. A brief summary of the investigations is as follows: Often boll weevil infestation records, based on the value of F, show highly significant or significant differences between the means of treatments, whereas yield records show no significant differences among the means of treatments. In 45 experiments the standard errors as percentage of the general means for boll weevil infestations ranged from 1.3 to 16.9 and for yields from 0.5 to 6.6. The standard deviations as percentage of the general means for infestations ranged from 7.6 to 63.0 and for yields from 2.4 to 28.5. Errors and deviations for infestations, when averaged, were 2.7 times greater than the errors and deviations for yields. A larger variation was found in the records of infestations than in yields. The infestations are samples of a biological population which are directly influenced by insecticides and subject to variation by the experimenter in making the records. Yields reflect the ability of the soil to produce under a given insecticide treatment and from an economical viewpoint are essential before final decision can be made as to whether or not insecticides against cotton insects are profitable. In randomized blocks standard deviations for yields were somewhat reduced as the plots were increased from 1/30 to 1/4 acre in size, whereas the deviations for infestations were somewhat larger in the 1/4-acre plots than in the 1/30-acre plots. Both standard error and standard deviation in 1/45- to 1/10-acre plots in Latin squares were smaller than in plots of 1/30, 1/10, and 1/4 acre in size in randomized blocks. Boll weevil infestations in plots treated with calcium arsenate at Tallulah, La., in 1938 and in 1939 were held as low in 1/30-acre plots as in plots containing 1/4 and 3/4 acre.

Boll examinations for bollworm injury in Arizona.--T. P. Cassidy, Tucson, Ariz., reports concerning studies made to determine the damage caused by the bollworm (Heliothis armigera Hbn.) in 1939 in the 6 leading cotton-growing counties of Arizona. Beginning the middle of September and continuing to the end of November, collections were made of 500 bolls from each of 70 fields of short-staple cotton, or 35,000 bolls; and 27,500 bolls from 28 fields of Pima or long-staple cotton, making a total of 62,500 bolls. Of the 35,000 short-staple bolls examined 505, or 1.44 percent, were bored by bollworms, and of the 27,500 long-staple bolls examined 217, or 0.79 percent, were bored. Tabulation by counties is as follows:

County	Bolls bored	
	Short-staple cotton	Pima, or long-staple cotton
	Percent	Percent
Maricopa	0.31	0.32
Graham	.65	.30
Pinal	.65	.32
Pima	4.00	1.36
Santa Cruz	5.80	2.65
Yuma	.93	None grown

These examinations agree with others made in previous years. No explanation is suggested as to why the bollworm should be more serious on cotton in Santa Cruz and Pima Counties than in the other counties. However, the fact that there are less cotton and other cultivated crops in Pima and Santa Cruz Counties might cause the moths to concentrate in the cottonfields of these counties. It is of interest to note that the 2 counties where bollworm injury is highest are the counties where injury to cotton bolls by hemipterous insects is lowest. These studies indicate the relative abundance and damage by bollworms to cotton in the different counties of Arizona but do not indicate the total damage, as no record was made concerning the number of squares destroyed or of injured bolls that dropped from the plants.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Condition of cotton crop in southern Texas and lower Rio Grande Valley of Mexico.--The greater part of April was unfavorable for the development of the cotton crop in southern Texas and the lower Rio Grande Valley of Mexico. While rain was received in that region during the latter half of March, high winds which followed dried out the moisture very quickly, and damaged the small cotton plants greatly. In order to shorten the growing period and create a more uniform fruiting of the cotton crop in the lower valley counties, the State issued regulations restricting cotton planting in that area to the period February 20 to April 1 and this period was later extended to April 20, on account of extreme drought conditions. Owing to these adverse circumstances, very little planting was done, except on irrigated land, until the last few days in March. This activity was carried on with unprecedented speed during the first 2 weeks in April, and by the 20th all cotton acreage had been planted. As a result of insect damage and other adverse factors, numerous requests for permission to replant began reaching State and Federal officials following expiration of the planting period. In response to this demand, the Commissioner of Agriculture issued a statement on April 24, granting permission to growers to replant cotton where previous 1940 plantings had been destroyed under conditions beyond the farmer's control. At the end of April, 69 special permits had been issued to replant approximately 786 acres. Cotton planting was also practically completed on the Mexican side of the Rio Grande during the first 2 weeks in April, although only a small acreage in that region was subject to a restricted planting date. Practically all cotton acreage in the Coastal Bend district had been planted by the middle of April but, owing to unfavorable conditions, much of it died out and had to be replanted. In the greater part of that district cotton plants are stunted on account of the drought, and the crop is later than usual for this period of the year.

Destruction of sprout cotton.--The destruction of sprout cotton in the lower Rio Grande Valley of Texas was continued throughout April, in an effort to maintain a host-free period for the pink bollworm until the blooming of the 1940 cotton crop. Following the rains in March, sprouts developed over practically the entire area. Preparation of the land for cotton planting reduced sprout cotton to a considerable extent; notwithstanding, it was necessary to maintain between 17 and 18 grubbing crews on this work during the greater part of the month. Toward the end of April it was exceedingly difficult to find sprouts in the advanced stage, and those found were very scattered and no further advanced than the 1940 planted cotton. In Starr County, along the Rio Grande, a few scattered cotton plants were found in a field that had been planted 7 years ago. The field had not been in cultivation since that time, and the surrounding area had grown up in brush. These plants were the largest ever encountered in the valley. One plant measured 14 inches in circumference just below the first limb, and the taproot of another measured 5 inches in circumference 1 foot below the ground. During the month sprout cotton was grubbed from 17,640 acres in the lower valley, making a total of 90,649 acres for the season. Most farmers over the area showed considerable interest in having their laborers remove all sprout cotton from fields as the cotton was being chopped. Contacts continued to be made with farmers in the Coastal Bend district during April in regard to removing sprout cotton, which was found in a few fields. Very satisfactory cooperation was given in most instances and efforts were made to destroy the plants before they fruited. The work of contacting farmers on the Mexican side of the Rio Grande, relative to the removal of stub cotton, was continued during April and grubbing crews operated intermittently in the Matamoros area.

Inspection in lower Rio Grande Valley.--Trap plots of cotton were planted on both the Mexican and American sides of the Rio Grande around the middle of January, with the expectation that they would come into fruiting considerably in advance of the 1940 planted cotton and be so attractive to any emerging pink bollworm moths as to draw them away from commercial plantings. However, owing to extremely unfavorable growing conditions, the cotton in these plots is very little in advance of the planted field cotton. Examination of material from plots on both sides of the river during the last week in April gave negative results as to pink bollworm infestation. Systematic bloom inspection in 1940 field plantings in the lower Rio Grande Valley is expected to begin about the middle of May. In connection with the grubbing of sprout cotton on the Mexican side, a total of 436 forms was inspected during the latter part of April with negative results. However, inspection of additional material, found on 1939 cotton stalks in a field 14 miles west of Matamoros, yielded 1 pink bollworm larva. Examination of the small amount of okra available during the period showed no pink bollworm infestation.

Pink bollworm program in Don Martin area.--During the latter part of April the Mexican Department of Agriculture took steps to inaugurate a pink bollworm control program for the Don Martin irrigation district at Anahuac, Nuevo Leon. Pink bollworm infestation was first found in that area during the latter part of the past year. There is a total of about 10,000 acres of soca cotton in that district. About half of this cotton is under cultivation and the remaining half consists of abandoned fields, on which a very poor stand of soca exists. The first step in the program being undertaken by the Defensa Agricola calls for the removal of all soca cotton in that area, and operations to this end were expected to begin early in May.

Situation in the Big Bend.--The control program being followed this year for the Presidio area of the Big Bend is similar to the "Two-Year Plan" employed with such outstanding success in 1938 and 1939 in reducing the heavy pink bollworm infestation in the Big Bend. Cotton planting started in practically all sections of the Presidio area on April 20, the date established by the State Department of Agriculture for the beginning of this activity, and no violations of this regulation occurred. Planting went forward vigorously during the last 10 days of April, with the result that a more uniform planting of the crop was obtained in that area than ever before. At the close of the month practically all of the acreage in the Presidio vicinity had been planted. In connection with delayed planting, the prevention of the fruiting of sprout cotton is essential. These combined measures create a host-free period until the highest peak of pink bollworm moth emergence has been completed in that area, as cotton planted after April 20 will not produce blooms before the middle of June. Scattered sprout cotton was grubbed from 8 or 10 acres of land during the latter part of the month. This phase of the program will demand considerable attention throughout May and the early part of June.

Destruction of stub cotton in Arizona.--One of the principal measures in the pink bollworm control program for Arizona is the regulation promulgated by the Secretary of Agriculture through the Agriculture Adjustment Administration requiring the destruction of stub cotton throughout that State. Exceptional cooperation has been received from growers in carrying out this control measure, and indications are that all requirements will be met by the deadline of May 10. The past winter and spring have been exceptionally favorable for 1939 stub cotton growth, which would have resulted, in many instances, in a complete stand for continued cultivation had it not been for the A. A. A. regulation. The elimination of stub cotton aids in the important objective of creating a host-free period during the peak of spring emergence of moths.

Wild-cotton eradication in Florida.--A program for the eradication of wild cotton in southern Florida was inaugurated in 1932. At that time a heavy infestation of the pink bollworm existed in this wild cotton, and this program was undertaken in an effort to prevent the spread of this insect into the cotton-growing areas of the United States. Good advancement was made in this program in all areas during April. Wild-cotton eradication in the Cape Sable area, which has been carried on during the present season with the aid of C. C. C. enrollees, was concluded around the latter part of the month, and this area was left in very good condition. The completion of the work in the Cape Sable area terminated the cooperative efforts of the C. C. C.

organization with this Division, and toward the end of April the personnel was withdrawn, although a number of the camp buildings were left at Cape Sable. Wild-cotton work was also carried on in the Bradenton, Fort Myers, and Keys subdistricts. Second cleanings for the season were completed in most of the areas during April and third cleanings were begun.

Thurberia-plant destruction.--A program for the destruction of the Thurberia plant was begun in the Tortillita and Santa Catalina Mountains of southern Arizona in 1935, following the discovery that this plant, which is closely related to cotton, was heavily infested with a boll weevil. This cotton insect was making its way to adjacent commercial plantings, from which it might have spread to other cotton-producing sections of the United States. The second coverage of the western slopes of the Santa Catalinas has been under way for several months, and an unusual number of Thurberia plants are being found in that part of the area now being worked. During April, 4,440 acres were covered and 136,884 Thurberia plants were destroyed.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Vegetable weevil larvae injure flue-cured tobacco in plant beds.--Norman Allen, of the Florence, S. C., laboratory, reports the occurrence of coleopterous larvae, tentatively identified as the vegetable weevil (Listroderes obliquus Klug.) in tobacco plant beds during April and May. Although injury by these larvae was confined to a relatively small number of plants on the margins of the beds, it appears that as this insect is of known economic importance it must be considered a potentially important tobacco pest. F. S. Chamberlin, of the Quincy, Fla., laboratory, had previously reported this species as injuring tobacco plants in beds but, so far as known, this is its first occurrence on tobacco in South Carolina or on flue-cured tobacco at any place.

Relationship between eastern and western species of Limonius.--H. P. Lanchester, of the Walla Walla, Wash., laboratory, reports that in the course of a comparative anatomical study of the larvae of two eastern and four western species of Limonius, it was found that they are all distinct and can be separated one from the other on clear-cut anatomical characters. The eastern species, L. agonus Say and L. dubitans Lec., are more closely related to the western species, L. canus Lec. and L. californicus (Mann.), than they are to L. infuscatus Mots. or L. subauratus Lec. Relationship between the two eastern species is apparently closer than between their most nearly related western species. Each of the two eastern species is readily separated from the other, and also from the four western species, on the basis of good anatomical characters.

Relation shown between density of population of different species of wireworms and cropping systems.--E. W. Jones, Walla Walla, reports that a wireworm census in 70 fields of the garden district of Walla Walla during the quarter ended March 31, disclosed that cabbage and carrot fields had high average populations of the Pacific coast wireworm (Limonius canus Lec.), whereas comparatively low populations of this species occurred in sugar beet and alfalfa fields. On the other hand, the larvae of the sugar beet wireworm (L. californicus (Mann.)) were comparatively numerous in sugar beet and alfalfa fields. The predacious wireworm (Hemicrepidius carbonatus Lec.) was numerous in rhubarb beds and appeared to be associated with correspondingly low numbers of L. canus. This predator was also abundant in alfalfa, carrot, and cabbage fields. Occasional individuals of L. californicus were found in field of rhubarb, asparagus, onions, and cabbage. The western field wireworm (L. infuscatus Mots.), which is ordinarily unimportant in garden districts, was fairly abundant in rhubarb fields. The meadow wireworm (Dalopius lateralis Esch.) was found in rhubarb plantings only, but Drasterius dorsalis Say was abundant in alfalfa and sugar beets. Cardiophorus tenegrosus Lec. was present in rhubarb, asparagus, onion, and cabbage fields.

Various sprays control cyclamen mite on snapdragon.--Floyd F. Smith, of the Beltsville, Md., laboratory, reports that, among 11 spray combinations applied to snapdragons for the control of the cyclamen mite (Tarsonemus pallidus Banks), lime-sulfur (1-200), a commercially prepared insecticide containing lauryl thiocyanate, white oil emulsion, and tartar emetic with glycerin were the most effective. Four applications of the spray combinations were made during December 1939 and January 1940 to snapdragon plants infested with T. pallidus. Their efficiency was compared on the basis of (1) plant injury by sprays, (2) injury by mites, and (3) population of mites on infested parts. Preliminary observations indicated that 1 application of most of the materials used was slow in action or ineffective. The final estimate of efficiency in control was based on the reduction of mite infestation on slightly injured tips, it being assumed that the severely injured tips could be removed by hand. A commercially prepared material containing cyclohexylamine diluted at the rate of 1-600, without additional spreader, severely injured young growth and cannot be recommended for spraying snapdragons, even though achieving a control of 90.4 percent of the mites. Ammonium polysulfide and sodium polysulfide at dilutions of 1-200, with a spreader, gave low percentages of control of 7.3 and 13.5 percent, respectively, and also were objectionable because of their odor.

Aphis gossypii transmits necrotic fleck of lilies.--Mr. Smith also reports that during the course of experiments on the transmission of necrotic fleck, a serious virus disease of lilies, it was found that the cotton or melon aphid (Aphis gossypii Glov.) transmitted the disease to approximately 65 percent of the exposed plants and was apparently the only efficient vector among the five species of aphids tested.

INSECTS AFFECTING MAN AND ANIMALS

Cube-sulfur dip effective against chicken lice.--Seventeen grown Buff Orpington hens, 3 large capons, and 11 young baby chicks were thoroughly dipped in cube-sulfur dip (1 pound cube-5% rotenone, 10 pounds 325-mesh sulfur, and 100 gallons water) on April 2. Several examinations, made from the seventh day after dipping to April 30, have not revealed a single live louse. There was no injury. The fluff of the feathers, after drying out, looked better than ever and the chickens were fat and healthy.

Diphenylamine and diphenylene oxide dissolved in benzol show promise in control of wool worms.--More than 100 sheep, experimentally infested with Phormia regina Meig., were treated with 15 percent diphenylamine or diphenylene oxide dissolved in benzol, or the same materials to which was added a certain wetting agent, such as turkey red oil. The formulae used combine a larvicide and protector against reinfestation in 1 treatment. The benzol acts primarily as a larvicide and carrier and, upon evaporation, leaves the chemical to protect the infested area against reinfestation. Preliminary studies in 1939 showed the treatment to be very promising, and tests so far this season substantiate these observations. Of the approximately 100 cases treated, only 1 treated animal (treated with diphenylamine-benzol) has become reinfested, whereas 21 of the 24 check animals treated with benzol became reinfested, all within 24 hours after treatment. The addition of a wetting agent, such as turkey red oil, results in faster kill of larvae, and causes the chemical to be deposited in finer particles and closer to the skin of the sheep which, under certain conditions, may be an advantage.

Effect of high temperatures on mosquito eggs.--Eggs of *Aedes vexans* Mg. and *A. lateralis* Mg. in moist soil were placed at 92° F. for 44 hours. When they were removed from the soil and placed in asparagine-phosphate solutions they hatched normally. Check eggs placed in tap water did not hatch. Eggs of these *Aedes* were also placed in moist soil and held at 98° for 6 days. In these tests *A. vexans* hatched normally but only 35 percent of the *A. lateralis* eggs hatched in asparagine-phosphate solutions. No hatch of either species occurred in tap water.

FOREIGN PLANT QUARANTINES

Forest litter and green-sphagnum insectary as packing.--A shipment of lily-of-the-valley pips from Denmark was packed in forest litter and green sphagnum, which proved to be a good insectary when examined on January 11 at New York. Most of the insects collected have been determined or partially determined now and it is found that more than 50 genera are represented in this collection of insects from 1 lot of packing material. The list of insect determinations follows: *Acrotrichis* sp., *Agonum mulleri* Hbst., *Aleochara* sp., *Anacaena globulus* Payk., *Anthocoris nemorum* (L.), *Apion flavipes* Payk., *Atomaria ruficornis* Marsh., *Atomaria* sp., *Cantharis* sp.?, *Cardiola obscura* Grav., *Cassida flaveola* Thunb., *Cercyon melanocephalus* L., *Cercyon* sp., *Ceutorhynchus atomus* Boh., *C. contractus* Marsh., *Chaetocnema concinna* Marsh.?, *Chrysolina brunsvicensis* Grav., *Corizus parumpunctatus* (Schill.), *Crambus* sp., *Cryptopleurum atomarium* F., *Cyphon* sp., *Drymus sylvaticus* (F.), *Ectobia lapponica* (L.), *Eurydema oleraceum* (L.), *Gyrohypnus* sp., *Hypera arator* L., *H. nigrirostris* F., *Lagynodes* sp., prob. new, *Lasius* sp. (*niger* group), *Liogma* sp., *Lygus pratensis* (L.), *Melanophthalma* sp., *Meligethes aeneus* (F.), *Metabletus truncatellus* L., *Mycetoporus* sp., *Notiophilus palustria* Dufts., *Oliarus* sp., *Olibrus* sp., *Omalium* sp., *Phaeogenes minutus* Wesm.?, *Phaeogenes* sp., *Philonthus* sp., *Phyllotreta undulata* Kutsch., *Propylaea quatuordecimpunctata* (L.), *Quedius* sp., *Sciaphilus muricatus* F., *Scydmaenus* sp., *Sphaeridium bipustulatum* F., *Stenus* sp., *Strophosoma melanogrammum* Forst., *S. rufipes* Steph., *Tachinus* sp., *Tachyporus chrysomelinus* (L.), *Tachyporus* sp., *Theroscopus pedestris* (Grav.), *Thyreocoris scarabaeoides* (L.), *Trachyphloeus aristatus* Gyll., *Trapezonotus arenarius* (L.), *Troilus luridus* (F.), and *Xantholinus* sp.

Champagne offered for orchid entry.--As the passengers were disembarking from the American S.S. *Sixaola* at New Orleans on March 14, 1940, the second steward informed the plant quarantine inspector that he believed a passenger was bringing orchid plants off. This information was given to the deputy collector of customs in charge of the baggage inspection, and when the Customs inspector got the declaration he was asked if the passenger had any plant material, to which she admitted that she had some orchid plants at the beginning of the voyage, but had thrown them in the ocean. Despite her efforts to appear calm and extremely sophisticated, there was an air of uneasiness apparent. The inspector proceeded with the examination, and in a short time found one orchid plant packed in her clothing. Toward the end of the inspection, six more orchid plants were taken from her personal effects. Neither her zeal nor her artifice had yet disappeared, however, and she then told the inspectors that if they would forget the plants, she would entertain them at a champagne party that evening. Instead of buying champagne, however, she was assessed a fine of $7 by the Customs, and the plants were seized and destroyed. This passenger gave the plant quarantine inspector some very interesting information, among which was the statement that no foreign country had any plant pests or diseases that the United States did not have already! She was informed that, had she followed the proper procedure, she could no doubt have had the plants with little expense or trouble. The plants were from Guatemala.

Infested fig cuttings from Italy.--A shipment of 11,000 fig cuttings arriving from Italy, carried in 18 large cases having a total weight of over 2½ tons, destined for ultimate planting at Santa Clara, Calif., was found on inspection at San Francisco to carry 41 species of insects, mites, snails, and other animals of which 9 were of known or potential major economic importance and either not known to occur or of very limited distribution in this country. Included in the latter group were numerous larvae in all stages representing 2 species of cerambycid wood borers (Pogonocherus hispidulus Pill.(?) and (?) Cerambyx sp.); a general infestation of scolytid bark beetles (Hypoborus ficus Er.) present in all stages; thousands of eggs with numerous newly hatched crawlers of a psyllid (possibly Homotoma ficus (L.)); a general infestation of ficus scale (Lepidosaphes ficus (Sign.)) present as adults with numerous eggs; thousands of eggs of a red mite (Tetranychus sp.); numerous adults representing 2 species of plant bugs of the family Lygaeidae (Tropistethus fasciatus Ferr. and Plinthisus brevipennis Latr.); an immature stage of mealybug (Pseudococcus sp.); and an adult curculionid weevil (Mecinus circulatus Marsh). The shipment was released only after being subjected to vacuum fumigation using methyl bromide and intensive reinspections at 15- and 25-day intervals following treatment to determine that the treatment had been effective against all stages of all of the pests found.

Delicious (?) larva.--A joint of sugarcane intercepted at Honolulu bore the following inscription: "We cut this from a sugarcane plantation, break open and chew on a piece--happy sweet tooth." An examination of the item showed the juicy section to have been entirely eaten by a well-developed larva of Rhabdocnemis obscurus Boisd. still present.

Pink bollworm by truck.--Pectinophora gossypiella (Saund.) was found in one of three cottonseeds on the bed of a truck from Mexico entering at El Paso on February 22.

One seed, three fruitfly larvae.--A small white sapote seed on the platform of a truck entering El Paso from Mexico on March 31 was found to contain three larvae of Anastrepha ludens (Loew.).

Entomological interceptions of interest.--A living larva of the papaya fruitfly (*Toxotrypana curvicauda* Gerst.) was intercepted at New York on February 19 in a bag containing papaya fruits in baggage from Puerto Rico. Two living larvae of the phaloniid *Lorita abornana chatka* Busck were taken at Nogales, Ariz., on December 16, 1939, in a small hot pepper in cargo from Mexico. A living specimen of the cicadellid *Draeculacephala minerva* Ball arrived at El Paso, Tex., on January 30 on a lettuce leaf in baggage from Mexico. Living adults of the mordellid *Mordellistena cattleyana* Champ. were found at Washington, D. C., on January 22 in an orchid leaf in express from Colombia. Eleven larvae of the East Indian bean pod borer (*Maruca testulalis* Geyer) were intercepted at New Orleans, La., on December 27, 1939, in string beans in ship's stores from Haiti. A living larva of the chrysomelid *Psylliodes chrysocephala* L. was found at Mobile, Ala., on January 29 in a turnip in ship's stores from Morocco. Living specimens of the coccid *Conchaspis angraeci* Ckll. were intercepted at San Juan, P. R., on August 30, 1939, on orchids in baggage from Dominican Republic. A living adult of the chrysomelid *Metriona tuberculata* (F.) was taken at Galveston, Tex., on January 29 on a banana fruit in cargo from Guatemala. A living specimen of *Lygaeus vittiscutis* Stal arrived at Laredo, Tex., on December 4, 1939, in head lettuce in baggage from Mexico. A living adult of *Cerotoma atrofasciata* Jac. was intercepted at San Francisco on January 3 on an orchid (*Oncidium cavendishianum*) in cargo from Guatemala. H. S. Barber reports that this chrysomelid is a serious enemy of beans in Guatemala.

Pathological interceptions of interest.--*Amphichaeta* sp. was intercepted on tree peonies from Japan in shipments arriving at Seattle during December and January. *Aphelenchoides subtenuis* (Cobb) Goodey was intercepted on October 5, 1939, at New York in a narcissus bulb from Holland. *Botrytis allii* M. T. Munn was intercepted on onions from Mexico on April 1 at El Paso. *Cercospora musae* Zimm. was found on April 11 at New York on banana leaves accompanying a large cargo shipment of bananas from Colombia. *C. nasturtii* Pass., a new record for Hawaii, was found on watercress in the field near Honolulu on March 11. *Cercosporella euonymi* Erikss. was found on *Euonymus* sp. from Japan in quarters at Seattle on October 24, 1939. *Colletotrichum graminicolum* (Ces.) Wils. was found on April 8 at New York on leaves of grass from Arabia. *Coniothyrium* sp., with spores smaller than in either species reported on orchids, was intercepted on December 11, 1939, at San Francisco on an *Epidendrum* sp. from Mexico. *Epichloe typhina* (Pers.) Tul. was found on April 8 at New York on *Festuca* sp. leaves in hay from Arabia. *Eutypa bambusina* Penz. & Sacc. was found on March 6 at New York on bamboo slats from Netherlands East Indies. *Gloeosporium cattleyae* Sacc. & D. Sacc. was intercepted on January 2 at San Francisco on *Cattleya gigas* from Colombia. *G. cymbidii* Verpl. was intercepted on November 28, 1939, at San Francisco on *Cymbidium* sp. from Japan. *G. laeliae* P. Henn. was intercepted at the same port on November 22, 1939, on *Laelia anceps* from Mexico. *Macrophoma oncidii* P. Henn. was intercepted on orchids from Colombia on January 9 at New York. Mosaic was found to be present on *Lilium harrisii* in baggage received from Bermuda at New York on April 25 by steamer and on April 28 by clipper. *Macrosporium* sp. with spores smaller than those of *M. camelliae* Cke & Mars. was intercepted at Seattle on December 21, 1939, on *Camellia japonica* from Japan. *Papulospora parasitica* (Eid.) Harz was intercepted on begonias on March 28 and on *Lilium henry* on March 29 at New York in shipments from Holland. Papulospora sp., apparently the primary agent in a rot of onions from Mexico, was intercepted on April 1 at El Paso. Phlyctaena ranunculacearum v. H. was intercepted on January 6 at San Francisco on Paeonia moutan from Japan. Phoma tenuis Pass. was intercepted on Camellia japonica on December 22, 1939, at San Francisco. Phomopsis perniciosa was intercepted on April 20 at New York on Prunus subhirtella sendaica from Holland. Phomopsis sp., no species reported on host, was intercepted at San Francisco on January 6 on Paeonia moutan from Japan. Phyllachora trifolii (Pers.) Fckl. (Polythrincium stage) was intercepted on April 8 at New York on clover in hay from Arabia. Phyllosticta camelliaecola Brun. var. meronensis Bubak was intercepted on December 22, 1939, at San Francisco on Camellia japonica from Japan. Physalospora cattleyae Maubl. & Lasn. was intercepted on January 3 at San Francisco on Cattleya sp. from Guatemala. P. japonica Togashi on Camellia japonica from Japan was intercepted on December 22, 1939, at San Francisco. Septoria lactucae Pass. was found on April 29 at New York on lettuce in stores from Brazil. Uredo erythroxylonis Graz. was common on Erythroxylon coca leaves in cargo from Peru inspected at New York on April 4. Uromyces trifolii (Hedw., F.) Lev. was found on March 14 at New York on shamrock from Ireland. Ustilago grandis Fries was found on April 6 at New York on Phragmites sp. from Holland.

DOMESTIC PLANT QUARANTINES

The grasshopper hatch.--In New Mexico the hatch of the migratory range 'hoppers began on April 11 in the Dunlap area along the De Baca-Chaves County line and was completed by the close of the month. Little migration from the egg beds had occurred, and some of the egg beds showed an 80-percent reduction in population from last year. The hatch in Quay County, N. Mex., was also practically completed by the close of April. In the Oklahoma-Texas Panhandle, species with migratorial tendencies began to hatch on April 14. In 1 small locality along the Frisco Railroad in Rockwall County, Tex., first and second instars of the differential 'hopper numbered from 5,000 to 8,000 per square yard. In parts of Colorado, Kansas, and Utah, various species were starting to hatch from April 25 through the remainder of the month. In the northern Great Plains no hatching was found to have taken place. Eggs of many species were in the coagulated and eyespot stages.

Surveys of grasshopper eggs.--Spring egg surveys in eastern South Dakota showed severe infestations of the differential and two-striped species, with indications of a prolonged hatching period. A cross-section egg survey was made in Hill County, in north-central Montana, and the number of egg pods found checked with the fall egg survey. "Never before," Project Supervisor R. L. Shotwell stated, "have I found such a uniformly high count of egg pods for an entire county.* * * Idle land covered with Russian-thistle and mustard have infestations that range from threatening to severe."

Development of crickets.--Mormon crickets in the first and second instars were present in Gilliam County, Oreg., by April 6. Coulee and Mormon crickets were found together in almost all instances in Jefferson and Wasco Counties, Oreg., in the early part of April. The coulee crickets were in the sixth instar on April 14 and the Mormon crickets in the fourth. By April 27 the coulee crickets were found only in the lowlands. The weather was rainy and cool and no general migration had occurred. Mormon crickets were observed migrating in Baker County, Oreg., on April 13, and in Franklin County, Wash., on April 20. The latter infestation appeared heavier than last year. In three counties in Utah, Mormon crickets were found in the first to fourth instars on April 17 and 19. Hatching in Wyoming was almost complete by the close of April. In Montana a 50-percent hatch had occurred in Big Horn County by April 20.

Getting ready for the 'hoppers and the crickets.--Meetings of the State leaders' grasshopper control committee, and of the field supervisors of the 'hopper and cricket control projects, were held in Denver on April 26-28, with Bureau representatives from the Washington and Denver offices. Programs for the 1940 crop season were discussed, and the plan of operations was worked out. Memoranda of understanding between the Bureau and the States have been drawn up and have been signed by officers of 14 States. In April supervisors set up the field and area offices, assisted State leaders with organizational meetings, checked bait materials in storage, and arranged for local transfers of such materials. Government vehicles have been moved out of storage, and 10 additional power bait spreaders have been constructed and distributed for use on Mormon cricket control.

Grasshopper baiting.--Grasshopper baiting was carried on the latter part of April in Kern and Fresno Counties, Calif., and in four counties in New Mexico. By the close of April materials were on hand in the majority of the various States in sufficient quantity to allow mixing stations to begin operations as soon as the need for baiting arises. Additional bait materials were being ordered and shipped to counties in the infested States as rapidly as requisitions from State leaders were received.

Mormon cricket control.--In several counties in Oregon, Nevada, Washington, and Wyoming, control operations had been initiated and all measures had been taken to rapidly expand the program as the need for control increases in the infested States. In Oregon 20 men employed on Federal funds were hand-dusting crickets in Baker County during the week ended April 27. Indian crews erected metal barriers and hand-dusted crickets on the Warm Springs Indian Reservation. Metal barrier was used effectively in stopping cricket migrations in the canyons. Baiting and dusting have also been highly effective, considering the weather. Power-dusting was begun on April 24 in Malheur County, Oreg.

Armyworms in the Southwest.--An outbreak of armyworms with reported damage of 30 to 35 percent occurred in the latter part of April in Curry and Quay Counties, N. Mex., and was reported as occurring generally in wheatfields throughout 13 counties in the Panhandle area of Texas.

Peach mosaic inspection under way.--The inspection of peach orchards for the peach mosaic disease went forward in April in California, Colorado, Texas, and Utah, cooperatively with the States, and some inspections were made along with tree removal work in Arizona and New Mexico. Special attention was given to nursery and budwood properties and surrounding zones within a mile thereof, in order to cover these areas by May 15, as provided in the standard State quarantines. In Utah the first inspection this season in Washington County, totaling over 1,200 properties, resulted in finding but 13 mosaic trees, approximately 95 percent less than the number found infected on the first inspection in 1939. Nine Bureau and nine State inspectors conducted the work in that county, and a second inspection is under way. Two men are carrying on the work in Grand County, Utah. In Texas results of the work completed in Tarrant County show infection on 21 properties for the first time, and no infection on 13 properties infected in 1939, nor on 20 infected in 1938 or 18 infected in 1937. Four mosaic trees were found in a nursery environs in Dallas County. Evidence of natural dissemination of peach mosaic was observed in a number of instances in eastern Texas. In tree-removal work in San Saba County, mosaic was found on wild peach trees, intermingled with wild plums. The Colorado work has been confined mostly to the heavily infected localities in Mesa County and it is observed that the heaviest infection found to date has been on properties on which symptomless carriers of the disease have been growing for some time. Cooperation by growers in the State is especially noteworthy this year. The 14 Bureau and State inspectors were assisted by 13 W. P. A. inspectors in Colorado. The California work included the removal of 534 diseased trees, and the inspection of Imperial County, in which no mosaic disease was found. Relief laborers took out abandoned and escaped trees during the month in 10 States infected with the phony peach or peach mosaic disease.

Peach mosaic and phony peach disease found on same tree.--In tree removal in San Saba County, Tex., in March, a peach tree was found infected with both mosaic and phony disease. This is the first instance known in which both diseases have been found on the same tree under natural conditions. Root tests made for the phony disease in the laboratory of the Bureau of Plant Industry at Brownwood, Tex., gave a positive reaction.

Peach-tree removal policy in California.--In order to expedite the removal from Riverside and San Bernardino Counties, Calif., of peach trees whic have been found infected with the peach mosaic disease in the last 4 years, a policy was recently adopted by the officers of that State, working jointly with this Bureau, under which it was proposed that all diseased trees should be promptly removed from the lightly infected districts of these counties. To that end, growers have been requested to sign waivers on diseased trees remaining on properties in the lightly infected sections, the State serving notices upon owners or occupants of premises who refuse to sign waivers. As a result of this policy, all mosaic trees had been removed from 71 percent of the properties in the lightly infected areas, at the close of April. There remain to be cleared 27 properties in 24 sections of the lightly infected areas. Two of the 34 heavily infected sections have also been cleared. It is believed that the hazard of spread of infection from the heavily infected areas, which are extremely concentrated, is much less than from the lightly infected, widely distributed, areas on which trees are scattered.

Egyptian alfalfa weevil survey completed.--As a result of the intensive survey just completed by approximately 15 men, under the leadership of H. T. Rainwater, infestations of the new species of alfalfa weevil, Hypera brunneipennis (Boh.), were found to extend about 4 miles west and 10 miles south of Yuma, Ariz., and to exist 2½ miles northwest along the highway near Winterhaven, Imperial County, Calif. Another infestation was found 7 miles northwest of Winterhaven near Bard, Calif. One infested alfalfa field was found at the end of the South Gila Valley near Yuma and 1 field at the northern end of North Gila Valley, near Laguna Dam, approximately 4 miles from the infestation near Bard. In addition, an infestation was found in the Salt River Valley near Tempe, Ariz. Intensive scouting was conducted in the alfalfa-growing areas radiating from Yuma, Ariz., and in the adjacent agricultural region in Imperial County, Calif., and general scouting was conducted throughout southern California south of the Tehachapi Range, particularly in the Imperial Valley. In addition, some scouting was done in the San Joaquin Valley and in the 2 main alfalfa-growing regions of New Mexico and western Texas, comprising the Mesilla-El Paso Valleys, and the Upper Pecos Valley from Roswell, N. Mex., to Pecos City, Tex., without finding any weevils.

White-fringed beetle control work.--Under W. P. A. clearing projects in operation in April in Florida, Alabama, Louisiana, and Mississippi, nearly 2,000 acres of infested woodland and other areas were cleared, in preparation for control operations during the active period of the beetle. Terracing and fallowing operations were begun at points in Alabama and Mississippi. Tanks for storing large quantities of oil in the field for ready use in preparing herbicides were placed at strategic points in all areas except the large cities, where truck deliveries can be obtained. Sprayers, dusters, and other equipment needed for the program have been conditioned and placed at several field points. The first instances this season of damage by larvae of the white-fringed beetle were reported as occurring the week ended April 26, in cornfields at Glendale, Fla., and Drewry, Ala.

Louisiana quarantine on white-fringed beetle revised.--The State of Louisiana, in a revision of the white-fringed beetle quarantine regulations, which became effective May 1, requires certification for the movement of the host products to a specified eradication area from other parts of the regulated area. Observations indicate that the control measures of the past two seasons have considerably reduced the beetle population in the New Orleans area.

Sweetpotato weevil control and eradication.--April activities on the sweetpotato weevil project in Georgia were centered in Thomas County. The 5-mile zones surrounding the centers of active infestation were cleaned up with the assistance of State-sponsored W. P. A. laborers, and no sweetpotato tubers were allowed in any instance to remain stored therein. In the last 2 months 824 storage sites in the county have been cleaned in this manner. A weekly check was made in that county of 160 traps or baits placed around fields where infested sweetpotatoes were last grown. Only 1 adult weevil was taken. In Alabama growers and State-sponsored W. P. A. crews were very active in cleaning up properties infested with sweetpotato weevils, removing seedbeds that had been placed contrary to quarantine regulations, and removing host material, both wild and cultivated, from properties adjacent to infested premises. Trapping operations in Baldwin County, Ala., resulted in taking several adult beetles. The Mississippi work was confined largely to the eradication areas in 10 counties, where State W. P. A. laborers cleaned up storage banks and fields. Inspection in old infested area in Lawrence and Jeff Davis Counties has resulted in finding no weevils in the last 12 months. Nearly 300 traps were set in 10 Mississippi counties without capturing any adult weevils. The inspection of commercial storage houses in the Texas counties of Smith, Gregg, and Upshur, gave negative results. In Nacogdoches County, inspections were made for volunteer sweetpotato plants on all properties found infested in 1939, and storage bank inspections were completed. Eight beds were found to have been placed within 1/2 mile of a property known to have been infested in 1939. These beds were required to be moved to a distance of more than 1/2 mile, as required in State quarantine regulations. Thirteen Federal inspector and 8 State inspectors from Alabama, 2 from Georgia, and 1 each from Mississippi and Texas, made up the inspection force.

More Japanese beetle larvae intercepted.--Japanese beetle grubs were recently found in an uncertified freight shipment of 21 large nut trees intercepted at Pittsburgh, consigned to a point outside the regulated area. Special attention has recently been given freight shipments at Pittsburgh, therefore consignments of stone, cable reels, sawdust, and plant material were inspected in April. The number of express shipments intercepted at Pittsburgh during April in violation of Federal quarantine regulations, exceeded by approximately 50 percent the interceptions during the same month last year.

Transit inspection in Northeast.--Stations in the northeastern region, represented by New York, Boston, Buffalo, Philadelphia, and Pittsburgh, intercepted 118 shipments in April which involved 1 or more violations of 3 quarantines, consigned to 24 States and Puerto Rico. Twenty-nine shipments not complying with State nursery-stock-shipping regulations were also reported to the States concerned. Nearly 42,000 shipments and 48,000 waybills were inspected by a force of 12 inspectors. Data relative to the origin, volume, and time of day that sack mail is worked in the New York terminals, were completed early in May. This information was made available through the cooperation of the Railway Mail Service and city postal officials, who supplied the inspectors with sack labels for all parcel post worked over a 24-hour period. At 3 terminals, over 33,000 sacks of mail are worked by postal clerks in a 24-hour period. During the busy part of the day the hourly average is 2,700 sacks, or 32,000 parcels.

Transit-inspection work at Birmingham.--At Birmingham, Ala., the State nursery inspector and the Bureau transit inspector have a joint cooperative arrangement for the exchange of information on nursery stock shipments not certified in accordance with Alabama regulations, or not meeting Federal quarantine requirements. Arrangements have also been made at the Birmingham municipal airport for the transit inspector to receive notices of shipments of plants regulated by Federal quarantines.

Interesting interceptions.--Among the interceptions at St. Paul in April was a shipment of 1,000 Mahonia plants moving from Washington State to Virginia without the permit required under the black stem rust quarantine.

Citrus canker eradication.--One of the premises which was reworked by the Louisiana and Bureau inspectors during the recent joint inspection activities in that State was a property in Calcasieu Parish, where citrus canker was found 4 years ago. There were then over 15,000 Citrus trifoliata on the premises, and canker was found on but a single tree 4 years old. On the discovery all the 15,000 trees on the property were destroyed. Each year thereafter the place has been searched, and in 1937 and 1938 over 2,600 young seedlings of this species of citrus were found, inspected, and destroyed. Going back in April of this year, the inspectors found and destroyed over 100 such young trees on the property. However, no canker has been found on the property since 1936, and it appears that the persistent removal of the seedlings is an important feature of the program. Similar work was carried on in April around 12 properties where canker has been found in past years, the inspectors searching for the disease over a 5-mile radius of the premises. Six Bureau inspectors and 3 State men carried on the work for 2 months ending April 3, and inspected over 1,400,000 citrus trees in 16 parishes in southern Louisiana. No canker was found. Cooperative inspection in Texas included the strip-working of areas in Harris County, with the assistance of 60 relief employees, and inspection in a small town, Navasota, in Grimes County, 50 miles from Houston, where 17 large citrus hedges were found.

CONTROL INVESTIGATIONS

Blood-cell glycogen in Prodenia eridania Cram.--At the Beltsville, Md., laboratory, J. Franklin Yeager and Sam C. Munson have found that histochemically detectable glycogen normally occurs in certain of the blood-cell types of the southern armyworm (Prodenia eridania Cram.). No blood-cell glycogen occurs at the time of hatching, but appears later, provided the larvae feed. During the larval instars glycogen increases toward a maximum in the prepupal stage but, after pupation, it rapidly decreases to a low level. In the first larval instar and in the adult, blood-cell glycogen occurs infrequently. It decreases as a result of starvation and increases with ingestion of glucose. In their ability to store and to release glycogen under conditions of starvation and carbohydrate intake, these blood cells resemble the glycogen-storing liver cells of vertebrates. As high as 86 percent of the armyworm blood cells can be made to contain glycogen by feeding large amounts of glucose. Glycogen was detected by use of the methods of Bauer, Best, and Lugol, with the mucicarmine method of Mayer and the salivary counterproof method used as checks.

INSECTICIDE INVESTIGATIONS

New insecticides patented.--H. V. Claborn, formerly of this Division, and L. E. Smith were granted U. S. Patent 2,197,249 on April 16, 1940. This patent covers a number of fluorene derivatives, particularly 9-fluorenol, 9-fluorenone, and 2-aminofluorene as insecticides. 9-Chlorofluorene at a concentration of 4 pounds per 100 gallons of water gave approximately 50-percent control of the codling moth. Another compound, 9-fluorenone, at a concentration of 10 parts per million gave 91.3-percent kill of mosquito larvae. Fluorene is an aromatic hydrocarbon and should not be confused with fluorine, which is a gaseous element related to chlorine and is found in sodium fluoride, cryolite, and barium fluosilicate.

BEE CULTURE

Stimulation of broodrearing.--Frank E. Todd, Davis, Calif., reports: "In 1928 Whitcomb and Wilson published a study of the removal of pollen from liquids held in the honey stomachs of bees. The significance of this appears to have been overlooked until it was recently noted in this laboratory that when pollen was added to sirups and fed to colonies, a stimulation of egg laying followed within 24 hours. It is the common conception that queens are fed by nurse bees and therefore this reaction would not be expected, because the field bee removes and ingests pollen from the nectar carried in its honey stomach. The field bees may, therefore, be the source of the queen food. Tests have been made of the rapidity of pollen-grain removal, by action of the proventriculus, from sirups fed to bees. When about 1,000,000 pollen grains per cc. of sirup was fed, about 850,000 were removed by action of the proventriculus within 15 minutes, and nearly all the grains were removed in the course of 1 hour. This was in the case of bees caught at the feeder, i.e., nectar carriers. When bees were taken from a colony and then fed, it was found that certain bees removed very little pollen from the sirup, which suggests that age of a bee may be a factor. In order to feed larvae, nurse bees must carry pollen-honey mixtures, and studies have shown such bees to be younger than field bees and within fairly definite age limits. In addition to this it also appeared that sirup concentration affected the quantity removed. Removal was more rapid with thinner sirups. Field counts of pollen grains in nectars have shown them to vary widely by plant source species. The plum ran about 1,800 grains per cc., while a wild plant--fiddle-neck--ran 88,000. Stimulation of broodrearing is known to vary with the season, which may also be tied up with plant source and pollen content of the nectar."

Sugar and pollen in orange nectar.--Geo. H. Vansell, Davis, reports: "The production of nectar in each blossom of the two commercial orange varieties (Navel and Valencia) in California is copious. There is a tendency for individual trees to alternate seasonally from heavy to light bloom, but it is very noticeable that not all the trees or orchards have the same cycle of alternation, which results perhaps in ample blossoms for a honey crop each year. The buds begin to secrete nectar several hours before the petals unfold and continue to do so for some time afterward, the time depending to a large extent upon temperature conditions. When exposed to excessive temperature (around 95° F.) the blossoms, as well as the buds, quickly drop away, but at cool temperatures each blossom remains for over a week. The sugar concentration in the opening buds is evidently 15 to 16 percent. Unless the weather is conducive to evaporation of water, very little interest in this nectar is displayed by the bees. In 1939, in Orange County, a foggy, humid period during the blossoming season caused the nectar sugar to remain between 16 and 22 percent almost continuously. The bees then sought the richer nectars from mustards, wild radish, hoarhound, and other plants, in preference to the orange. On the other hand, in 1940 dry, warm air accompanied by gentle though strong winds resulted in nectar with an occasional concentration of 49-percent sugar in the older blossoms, the average for certain periods being 30 percent. Under this situation, the bees eagerly visited the orange trees, selecting the blossoms with the richest nectar, to store, at least on 1 day, a 20-pound nectar supply per colony. The hand-collected Navel nectar contained no pollen, whereas that from the Valencia had on an average of 18,000 pollen grains per cubic centimeter."

Use of pollen traps.--An interesting use of the pollen trap, an apparatus for removing the pollen loads from bees entering the hive, is reported by Warren Whitcomb, Jr., of the Baton Rouge Laboratory. He says: "The pollen trap was first devised to determine the amount of pollen brought in by bee colonies and as a means of experimentally limiting the amount of pollen in the hive. Later it was used for gathering large supplies of pollen for feeding experiments. More recently the pollen trap has been used for gathering pollen in areas where poisoning of bees by insecticides has been suspected and for collecting pollen from tung trees for use in pollination studies."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Ball collection comes to National Museum.--The insect collection of E. D. Ball, which has recently been transferred to Washington, represents probably the most valuable single addition that has ever been made to the collections of auchenorhynchous Homoptera at the National Museum. Comprising some 70,000 specimens, largely North American representatives of the families Cercopidae, Membracidae, Cicadellidae, and Fulgoridae, the collection is of particular importance in taxonomic studies on these groups because of the large amount of type material included and the valuable biological information associated with many of the specimens. It is estimated that the collection contains representatives of 2,300 species, of which probably half are represented by either types or paratypes. The number of holotypes in the collection is approximately 650.

Weevils in sweetpotatoes from Africa.--The Division of Foreign Plant Quarantine inspectors at Philadelphia recently intercepted 27 living adults, as well as a large number of larvae and pupae, of Cylas in sweetpotatoes from Portuguese West Africa. One of these adults and several of the immature specimens belong to C. femoralis Faust, whereas the remainder of the lot represents a different species, which appears to be C. puncticollis Boh. The latter was heretofore represented in the National Museum collection by a few unnamed specimens, previously intercepted at Philadelphia, from Sierra Leone, Africa, and British West Africa. C. puncticollis Boh. was described from Senegal and has been reported from several other African localities. It seems to be, at times, decidedly injurious to sweetpotato, though it is not so important economically as the commoner and more widely distributed Cylas formicarius F. The several species of Cylas recorded as breeding in sweetpotato tubers all belong, so far as known, to a section of the genus characterized in part by the slender form of the body, and by the fact that the hind femur does not surpass, or only slightly surpasses, the tip of the abdomen. Of the species of the other section, characterized by a stouter body and a relatively longer hind femur, almost nothing is known biologically, though it may be reported that J. C. Bridwell reared one species of this group (evidently C. submetallicus Desbr.) from seed pods of Merremia chryseidis at Mangalore, India, in 1927.

Weevils received from Chile.--Among the miscellaneous insect material collected by P. A. Berry in Chile, and recently submitted to the Division of Insect Identification, were long series of three species of the weevil genus Pantomorus, namely, leucoloma (Boh.) (white-fringed beetle), godmani (Crotch) (Fuller's rose beetle), and an undetermined species near taeniatulus (Berg); and, in addition, moderate numbers of at least two species of Listroderes. The godmani specimens are of some interest as being the first extensive series from South America received for the National Collection, and tend to confirm the previous supposition that South America is the native habitat of this widespread species.

A geometrid new to United States.--J. F. Gates Clarke recently received for identification from John L. Sperry, of Riverside, Calif., two males of Drepanodes epionata Guenée (=D. pionaria Walker), a West Indian geometrid hitherto unrecorded from the United States. One specimen had been collected at Brownsville, Tex. ("23-X-35"), and the other in the Baboquivari Mountains, Ariz. ("27-IV-38").

Observations on a southwestern bedbug.--Through Miss M. O. Nolan, of the National Institute of Health, there were recently submitted for identification a number of small cimicids which were determined by H. G. Barber as Haematosiphon inodorus (Duges). A letter from Miss Nolan gives the information that these bugs were received from Mrs. John Van N. Dorr 2nd, wife of a member of a party from the U. S. Geological Survey who were mapping the Atolia tungsten mining district near Red Mountain, Calif. Mrs. Dorr writes: "We find them here in the wood of old mine shafts where they appear in hordes. They seem to be just coming out for the season since we have found them on the dumps where they were not to be seen a few weeks ago." She said it was necessary "to fight off the hundreds of bugs which wanted to make a free meal of us." Specimens were observed feeding on one of the members of the party. No information is furnished as to the particular host of the bug in this case. In the Southwestern States and in Mexico this bug infests poultry. Townsend has reported it as "spreading from the roosts to dwelling houses where it proves more formidable than the bedbug." According to available records, this species of the bedbug family occurs throughout the Southwestern States and has been taken as far east as Kansas.

A Chinese scale insect discovered in United States.--Specimens of a diaspine scale received from J. Allison Denning, of the Missouri State Department of Agriculture, reported as collected in a nursery at Glendale, Mo., on althaea (presumably Hibiscus syriacus) have been identified by Harold Morrison as Parlatoria chinensis Marlatt. This appears to be the first record of the occurrence of this insect in the United States. The species has been intercepted several times by the Division of Foreign Plant Quarantines on material coming into this country from China on rosaceous and other plants, and Sasscer (Jour. Econ. Ent. 11, 1918, p. 126) suggests that the species is apparently a serious pest in China.

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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR MAY 1940

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FRUIT INSECT INVESTIGATIONS

Effect of methyl bromide-hydrocyanic acid mixtures on Japanese beetle larvae.--W. E. Fleming, E. D. Burgess, and W. W. Maines, of the Japanese beetle laboratory at Moorestown, N. J., have reported on tests with mixtures of methyl bromide and hydrocyanic acid against larvae of the Japanese beetle. The tests were undertaken to determine whether the toxicity of the mixtures of these materials to the larvae was any greater than could be predicted from the toxicities of the isolated constituents. The methyl bromide and the hydrocyanic acid used in this investigation were the commercial grades used for fumigating purposes. The experiments were conducted in a 1,000-cubic-foot fumigation chamber at temperatures of 60° and 70° F. The air in the chamber was circulated continuously during the treatment. The methyl bromide was measured by weight on a solution balance and the hydrocyanic acid by volume in a special measuring cylinder. Both materials were vaporized by dropping them onto a copper coil maintained at a temperature of 160°. In conducting these experiments, the larvae were removed from soil, placed in groups of 100 individuals in special cages without soil, and subjected to the fumigating treatment. A total of 29,400 larvae were subjected to methyl bromide, hydrocyanic acid, and mixtures of these materials. At the completion of the treatment the larvae were transferred to special trays for observation. A record was made of the numbers dead, moribund, and normal in each treatment at intervals subsequent to removal from the chamber, the final observation being made at the end of 1 week. The tests showed that there is a definite synergistic action, in that a mixture of methyl bromide and hydrocyanic acid is more toxic to Japanese beetle larvae and the rate of insecticidal action is faster than would be anticipated from the inherent potencies of the components.

Development of Japanese beetle larvae in Philadelphia area.--As a result of larval surveys made late in May and early in June, T. N. Dobbins, Moorestown, has reported that in the Philadelphia area larval development was from 10 days to 2 weeks later than would be normally expected, as based upon the summary of soil surveys conducted during the years 1926-36, inclusive. In an average year the rapid metamorphosis preceding emergence becomes evident during the last few days in May in the latitude of Philadelphia. Surveys made in pastures (June 5) revealed no definite prepupae and less than 20 percent of the larvae undergoing the characteristic changes which immediately precede the definite prepupal condition. Normally approximately 16 percent of the soil forms are definitely prepupae at that period. Assuming normal air temperatures and precipitation for the remainder of June, very little emergence of adults will be evident in this area before the early part of the last week in June. Observations by other members of the laboratory staff show that, in general, the same conditions prevail at other points or areas, such as Westchester County, N. Y., northern New Jersey, Cape Charles, Va., Washington, D. C., and Harrisburg, Pa. In general, late spring development of larvae at all these places is from 10 to 14 days behind the normal; therefore beetle emergence will probably be somewhat delayed.

Colonization of Tiphia vernalis, a Japanese beetle parasite.--Late in May and early in June, J. L. King and associates, of the Moorestown laboratory, collected in the field and redistributed 151 colonies of 100 or more females each of *Tiphia vernalis* Roh., the imported wasp parasite of the Japanese beetle. In addition, 2,500 female *Tiphia* were supplied the Maryland State entomologist for rearing purposes and 500 were retained for experimental rearing at Moorestown. In all, a total of 19,745 females were collected on 4 collecting days. The 151 colonies were distributed as follows: New York, 50; New Jersey, 33; Pennsylvania, 38; Connecticut, 14; Delaware, 8; Washington, D. C., 8.

Plum curculio sprays effective.--The value of the petal-fall and shuck-off applications of lead arsenate spray for reducing the overwintered population of plum curculio adults in peach orchards is shown in jarring records reported by Oliver I. Snapp, of the peach-insect laboratory at Fort Valley, Ga. Jarring for adult plum curculios during the periods between petal-fall (time for first spray) and shuck-off (time for second spray), and between shuck-off and the beginning of the stone-hardening period, showed that there were more than twice as many plum curculios on the trees that did not receive the petal-fall and shuck-off applications of lead arsenate as on those that received these sprays. The results of the first jarring after the fruit entered the stone-hardening stage (May 8), indicated that the lead arsenate was losing its effectiveness after a period of 23 days following the shuck-off application, owing to weathering and to the growth of the fruit.

Blapstinus spp. hibernating in vineyards.--While making examinations of bark on grapevine trunks and of samples of nearby soil in the course of a survey of the overwintering population of larvae of the raisin moth (*Ephestia figulilella* Greg.), Dwight F. Barnes and George H. Kaloostian, of the Fresno, Calif., laboratory, recorded the presence of small darkling beetles of the genus *Blapstinus*. The work was done from January 4 to February 9, 1940. The species found were *B. rufipes* Casey and *B. dilatatus* Lec. Both were present under the rough bark of the vines in 6 vineyards, and the average number was 4 per vine on 60 vines. In soil near the vines 262 were found in 14 1-square-foot samples. Records separating the species were made of the collections from 10 1-square-foot samples of soil. The total was 138, of which 117 were *B. rufipes* and 21 were *B. dilatatus*.

MEXICAN FRUITFLY CONTROL

Fruitfly infestations decrease.--The annual tree-to-tree inspection in the area regulated under Quarantine 64 was completed by May 31. Reports from each district indicate that a very thorough inspection was made and that little opposition was encountered in obtaining complete compliance with quarantine regulations. There was a decided decline in the number of properties found infested with Mexican fruitflies throughout 1939-40. In the crop year of 1938-39 infested fruit was located on 2,141 plantings. During the season just closed, infested fruit was found on only 578 groves. Traps continued to take many flies but few of them, when caught, appeared old enough to infest fruit, had any fruit been available for oviposition. If the seasonal trend in the fly population follows the path of previous years there should be a marked reduction in the number of flies in the groves by the early part of June.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Relation of European corn borer larval infestation to popcorn yield.--Morris Schlosberg, Toledo, Ohio, reports that a study of the effect of European corn borer larval infestation on the production of popcorn was made in 1939, near Toledo. The tests were conducted with a commercial hybrid strain of white popcorn planted on June 7, using 5 levels of infestation treatment, obtained by progressively higher hand applications of laboratory-produced egg masses, replicated 5 times in a Latin square. Larval population data were obtained on 5 plants and yield data on 20 plants in each plot. The larval populations, expressed as the mean number per plant per treatment level, and the yields, expressed as the mean number of pounds of shelled popcorn,[1] corrected for 15.5 percent moisture, per 20-plant sample per treatment level, are given in the following tabulation. The zero level of infestation indicated a complete escape from oviposition by the moths of a single-generation strain and the first generation of a 2-generation strain of the borer present in the locality, owing to competitive effects. Infestation by the second generation of the 2-generation strain, determined from samples of plants later dissected, was found to be uniformly distributed among the treatment levels within the limits of sampling error, thus failing to effect level-to-level changes in yield. The larval populations shown represent the surviving progenies from the egg masses placed on the plants by hand, since only these were concerned in producing level-to-level changes in yield. The yields represent the grain shelled from all the ears, regardless of condition. On the basis of the data shown in the tabulation, the coefficient of regression of yield on larval population was determined to be -0.121 ± 0.0057 pounds of shelled popcorn per plot (20 plants) per larva per plant. The mean yield of shelled popcorn per plot in the absence of borer infestation (the potential yield) was estimated to be 1.93 ± 0.038 pounds. From these values, the mean rate of loss of yield of shelled popcorn per additional larva per plant was calculated to be 6.27 ± 0.102 percent. The utilization of this index of loss is somewhat limited by the fact that it represents the results of a single strain at a given stage of plant development. It is probable that the index reflects a higher than average severity of injury to the plants, owing to the early stage of development of the strain when infestation occurred. Other studies have shown that the relative stage of development of the plants when infestation occurs affects the per borer rate of loss, higher rates of loss being associated with infestation at earlier stages of plant development.

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[1] Coefficient of simple correlation -0.947, highly significant (3 degrees of freedom).

	Mean number of larvae per plant	Shelled popcorn per 20-plant sample (corrected for 15.5 percent moisture)
		Pounds
	0.00	1.93
	2.00	1.72
	2.80	1.55
	5.32	1.31
	6.52	1.14
Standard error	0.505	0.119

The immediate effect of injury of the plants by the larvae was reflected in the production of smaller and fewer ears. As the level of infestation increased, a number of the potentially usable probably primary ears tended to be reduced to the nubbin class, and a number of the potentially nubbin ears, probably secondary, failed to be produced, thus reducing the total number of ears. The production of relatively smaller ears at the higher levels of infestation was reflected in the relative weights of the ears. A distinct shift in the frequencies of heavier and lighter ears toward the production of lighter ears, was evident at the higher levels of larval population. The actual size of the ears, as reflected by their length and diameter, was found to account for approximately 96 percent of the variability in weight among the ears.

Recovery of introduced parasite of the vetch weevil.--J. S. Pinckney, Carlisle, Pa., reports that in May and June 1939 two releases of the foreign parasite Tetrastichus sp., imported from the European parasite laboratory in France, were made in North Carolina. At the Piedmont Experiment Station, located at Statesville, 1,175 were released on a plot of vetch on May 26 and 1,089 were released on June 2 in a vetch field near Salisbury. Three collections of pods were gathered on 3 different dates at each release area, brought into the laboratory, and placed in rearing boxes. Since March 20, 1940, 5 females of this species have been reared from this material--4 from the area of release at Statesville and 1 from the Salisbury area.

Reaction of plants to hessian fly not influenced by treatment of wheat seedlings with colchicine or thiamin.--E. T. Jones, of this Division, and H. D. Young, of the Division of Insecticide Investigations, Manhattan, Kans., report that tests to ascertain whether plants treated with colchicine and thiamin would react differently to infestation by hessian fly showed that treatment with these substances does not affect the resistance or susceptibility of wheat plants to hessian fly infestation. Although vigor of growth of the plants treated with colchicine apparently was reduced and in the plants treated with thiamin vigor was increased, especially in the early stages of growth, neither treatment increased the compactness or looseness of the leaf sheaths (a factor which undoubtedly is involved in the survival of fly larvae in the critical first stages of development). Based on a quadruplicate series with 100 plants examined, for each separate variety and treatment, results were as follows:

Variety of wheat	Plants treated with				Untreated plants	
	Colchicine		Thiamin			
	Infested	Pupae per infested plant	Infested	Pupae per infested plant	Infested	Pupae per infested plant
	Percent	Number	Percent	Number	Percent	Number
Susceptible:						
Tenmarq	83	3.0	95	4.2	95	3.4
Ceres	89	1.9	92	2.9	88	2.5
Kawvale	69	3.2	77	3.5	71	4.0
Resistant:						
Illinois No. 1 W38	1	1.0	0	0	2	1.5
Triumfo	59	2.1	50	2.3	57	2.5

The thiamin treatment consisted of soaking the seeds in a solution of thiamin of commercial strength. The solution was also applied to the soil for an extended period as the plants developed. The plants treated with colchicine were sprayed daily during early growth with 0.5- and 1.0-percent solutions. In addition to this experiment, seeds of the varieties mentioned were soaked in 0.25- and 0.5-percent solutions and day-old seedlings in 0.1-percent solution of colchicine for 12 hours. Most of the seedlings and the plants resulting from the treated seed died from poisoning, but surviving plants exposed to infestation gave results comparable with the results obtained with the sprayed series.

Vacuum fumigation of sacked feed with methyl bromide.--R. T. Cotton and J. C. Frankenfeld, Manhattan, report that in the vacuum fumigation of oat feed with methyl bromide, a dosage of 4 pounds of the fumigant per 1,000 cubic feet of space, with a full load, gave a 100-percent kill of flour beetle eggs and adults with a 3-hour exposure. With a 15-hour exposure a dosage of 3 pounds per 1,000 cubic feet of space gave a complete kill. The temperature of the feed in the first case was 67° F. and in the second 68°.. It is interesting to note that in both cases insects were actively crawling over the bags of feed when they were removed from the vacuum chamber at the end of the fumigation. They were all dead, however, within 24 hours. This delayed killing effect is characteristic of methyl bromide and some other fumigants.

Wind interferes with mill fumigation.--Messrs. Cotton and Frankenfeld also report that in the recent fumigation of a brick flour mill and warehouse with methyl bromide during a period when the wind reached at times a velocity of 38 miles per hour, practically no kill was obtained in the warehouse, which was on the windward side of the building. The gas was apparently all blown over into the mill, where the kill was satisfactory. The dosage of 1 pound of methyl bromide per 1,000 cubic feet had been found entirely adequate in the warehouse last year, when there was no wind. The desirability of delaying a fumigation until the wind has died down is evident.

JAPANESE BEETLE CONTROL

Farm-products quarantine for Japanese beetle modified.--Effective May 27, regulations under the Japanese beetle quarantine on the movement of fruits and vegetables were modified to limit the restrictions to fruits and vegetables moving from the area of heavy adult flight via refrigerator car or motortruck. An analysis of inspection records for the last several years shows that a negligible number of beetles have been removed from the 9 articles of fruits and vegetables under quarantine when moved by any means of transportation from the entire regulated area. Maintenance of inspection centers in such sparsely infested cities as Boston, Mass., Pittsburgh, Pa., and Canton, Ohio, can no longer be justified by the few adults removed from farm products submitted for inspection at these points. Under the revised regulation, restrictions have been lifted on the movement of small, noncommercial lots of fruits and vegetables moving by passenger vehicle, parcel post, freight, and express. Inspection centers for farm products are now concentrated in the heavily infested area where the beetles are particularly likely to infest unscreened refrigerator cars and motortrucks. These carriers furnish suitable conditions for survival of the adult during trips of considerable distance. Coincident with this modification, the road-inspection force stationed on the western border of the regulated area was reduced. Inasmuch as there is a heavy southbound truck movement of fruits and vegetables from the heavily infested area, the road-inspection stations on southern exit highways will be fully staffed. There will be 19 inspection centers set up in the area of heavy beetle flight--9 in Delaware, 1 in the District of Columbia, 4 in Maryland, 1 each in New York and Pennsylvlania, and 3 in Virginia. There were no reports during May of adult beetle emergence in the field, although numerous reports were received of adult beetles being observed in unclassified greenhouses.

Summer fumigation of fruits and vegetables for Japanese beetle.--Preparations were being completed during May for the fumigation with methyl bromide of farm products in refrigerator cars, and the fumigation of empty cars with hydrocyanic acid prior to loading with certified products. The Pennsylvania Railroad Company has on hand a supply of methyl bromide in cylinders with 15-pound applicators, so that the more adaptable 1-pound cans cannot be used until the supply of cylinders is exhausted. A commercial concern is developing a simple and inexpensive can opener especially designed for opening cans of methyl bromide. As soon as a good working model is available tests will be made to determine its effectiveness. On May 27 a conference was held at Cape Charles, Va., with officials of the Pennsylvania Railroad and the Fruit Growers Express concerning arrangements for the inspection and fumigation of refrigerator cars containing fruits and vegetables destined to nonregulated territory from the Eastern Shores of Maryland and Virginia. It was decided that cars arriving by barge from Norfolk should be screened on the Cape Charles side if they arrived during the night or before 9 a. m. All cars that will arrive on the Eastern Shore after 9 a. m. or during the day are to be screened at Norfolk.

Sampling of lead arsenate treated plots completed.--Soil sampling of nursery plots treated with arsenate of lead for Japanese beetle control was completed this month, with the exception of resampling of plots that were replanted after the initial samples were lifted. The 750 samples taken this season are approximately 100 fewer than those collected last spring. This decrease is due principally to the abandonment of leaded plots and cold-frames on a large nursery in central New Jersey. As soon as the analyses have been completed at the Moorestown, N. J., laboratory, the nurseries will be notified of the results. Present indications are that lead arsenate treatments will increase this spring. Because of lack of information as to the extent to which evergreens may be safely fumigated with methyl bromide and in view of some injury that has been experienced by growers who have fumigated certain evergreens, despite the lack of experimental results, many nurserymen will continue to treat plots with lead arsenate until more data have been obtained on the adaptability of methyl bromide for this type of nursery stock.

One in and one out of Japanese beetle regulated area.--A large hydrangea grower in the Baltimore, Md., area has completed the consolidation of his Tennessee establishment with his present Maryland nursery, where he has started the erection of four new greenhouses. Establishment of the Tennessee branch of the nursery was for the purpose of avoiding the restrictions imposed by the Japanese beetle quarantine. Since development of methyl bromide fumigation, however, this grower has had an easy and satisfactory means of obtaining certification of all his plant material. Consequently maintenance of the Tennessee plantings is no longer warranted. During this same period, a nurseryman at Gray, Maine, has moved his entire young-evergreen nursery to an uninfested area in New York State, where a better type of soil is found for the growth of seedlings, and so that he could avoid the restrictions of both the gypsy moth and Japanese beetle quarantine regulations.

Soil treating at six isolated Japanese beetle infestations in Ohio.--A total of 84.75 acres was treated with lead arsenate at the rate of 500 pounds per acre in six Ohio cities in May. The largest acreage was treated in Belpre, where 21.9 acres was covered between May 8 and 17. At Conneaut, 17.6 acres was treated between May 20 and 31, the work continuing into June. Treating work, begun in Marietta on April 12, was completed on May 8, with a total of 19.6 acres treated in the city, 11.65 acres of which was covered in May. In Zanesville, 12.6 acres was treated from May 9 to 21. The work under way in Gallipolis since April 15 was terminated on May 6, with a total of 25.7 acres treated in April and 11.8 acres covered in May, for a total of 37.5 acres. Treating was still in progress in Ashtabula at the end of the month. From May 22 to 31, 9.2 acres was treated in this city.

Bulk shipments from nursery in New Jersey infested with Japanese beetle.--Four carloads, comprising approximately 750 evergreens, were dug and shipped under certification at one large New Jersey establishment. Half of these were fumigated with methyl bromide and the balance came from plots treated with lead arsenate. Several truckloads of plants were also moved from this property to Radio City in New York and to the New York World's Fair. About 75 men were employed by the nursery to clear off and burn unsalable stock from large blocks which had been standing for years. These plots will be replanted with young stock. Several large blocks of *Taxus* were being prepared for treatment with arsenate of lead for fall certification. Although carload movement of stock from this establishment dropped during May, business is reported as very consistent and equal to that of 1939.

Seasonal Japanese beetle trap program started.--Supplementing the few traps distributed in Florida during April, additional traps were distributed in 13 Florida localities in May. Trapping was also started in Atlanta, East Point, Fort Valley, Jonesboro, and Thomaston, Ga. In North Carolina traps were set in New Bern and Wilmington, and trap placement was under way in Goldsboro on the last of the month. A trap route was established in Charleston, S. C., on May 18.

Road-patrol activities.--Establishment of road-patrol stations, begun on April 15, continued through May 5. For most of May there were in operation 16 vehicular inspection stations--6 in Virginia, 1 in West Virginia, and 9 in Ohio. The inspection corps was comprised of 35 men. From uncertified plant material intercepted at the post during the month there were removed 55 larvae and 2 pupae of the Japanese beetle.

Japanese beetle certification of tourist purchases at Mount Vernon.--During the month ivy plants destined to 36 States were certified for the Mount Vernon Ladies Association, owners of the George Washington estate on the Potomac River. Considerable ivy and boxwood propagated from the original plantings on the estate are sold annually for shipment all over the United States.

Taxus weevil control supplemented for quarantine purposes.--A nursery in the New York City area, which has been treating a nursery block with arsenate of lead for taxus weevil control, has arranged for the analysis of the soil in the plot so that they may add enough of the insecticide to enable them to secure Japanese beetle certification of their plantings next fall and spring.

Gypsy moth egg clusters found on shipments from formerly permitted establishments.--In the Middletown, Conn., area, where many of the nurseries were formerly permitted after having been found free from either Japanese beetle or gypsy moth infestation, five gypsy moth egg clusters were removed from nursery stock shipped from this area under certification during the spring shipping season. Some of the infested shipments were destined to Illinois. Following the discovery in 1939 of gypsy moth infestation on or near several of these establishments, the permit arrangements were canceled and all stock from the nurseries in this shipping center was made subject to actual inspection prior to certification.

New England gypsy moth inspection results.--Among the hundreds of shipments submitted for gypsy moth inspection during the month were 16 containing gypsy moth egg clusters. Seventy-three egg masses were removed from these infested shipments. Four egg clusters came from nursery stock, 10 from a collection of native trees, and 59 from a dozen carloads of lumber. No extremely heavy infestations were found in any of this material. The greatest number taken from any one shipment consisted of 23 egg masses found on a carload of lumber inspected at Madison, N. H., for transportation to Brooklyn, N. Y. In addition, at Conway, N. H., 3 egg masses were removed from 1,200 wood novelties that were examined for later shipment under certification to points outside the infested zone.

New England nursery shipping season extended.--Because of continued cool weather and considerable rain during May, New England nurseries were able to carry on digging and shipping operations during the entire month. This was of considerable advantage to them as they had a late start. Ten temporary inspectors and one of the district inspectors in the Portland, Maine, district were assigned to a forest nursery in that area for a period of approximately 2 weeks to inspect and certify young evergreens. Approximately 2,150,000 trees were examined and certified. A total of 6,080 certificates was required to certify this material. The spring shipping season of this establishment was completed by the end of the month.

Peeling machine will facilitate pulpwood inspection.--The freight yard at Groton, Vt., was filled during the month with government-owned pulpwood. According to the freight agent there, it was estimated that 1,000 cords of this wood would be shipped from that point. Most of this wood still retains its bark. It is understood that a peeling machine will be used on the wood before it is shipped. This will make it possible to inspect the operation and certify any wood destined to points outside the gypsy moth regulated zone.

Dutch elm disease quarantine violation discovered in Connecticut.--On May 13, while at a private estate inspecting 1½ cords of fuelwood for shipment to New Jersey, the gypsy moth district inspector from Westerly, R. I., learned that 21 Chinese elm trees had been received on the property from New Jersey. An immediate investigation of this violation of the Dutch elm disease embargo was made. The landscape gardener who moved the trees to Stonington, Conn., from Caldwell, N. J., claimed that he was unaware of the restrictions of Quarantine No. 71 at the time he made the plantings. At the direction of the owner of the estate, the trees were destroyed on May 22 in the presence of the district inspector.

Bark-beetle emergence.--In Bucks County, Pa., beetles (*Scolytus multistriatus* Marsh.) were observed emerging and in flight late in the month. A few trees were noted in which the beetles had entered for breeding purposes. A check at the end of the month on beetle trap logs in the Pennsylvania infected zone showed that only a few of these had been slightly attacked. During the last week in the month a first inspection was made of the trap logs placed early in May in the Athens, Ohio, area. Beetles were found entering the logs. Most of the traps examined showed evidence of heavy beetle attack.

Difficult elm-sanitation assignment.--A Bucks County, Pa., sanitation crew was engaged during the month in the clear cutting of elms on a cliff in the "Narrows" along the Delaware River. This is a hazardous undertaking, since the cliff is nearly perpendicular at this point. One unit in Pike County, Pa., is working in a swamp in Porter Township, cleaning up elm debris left by a twister. Trees were broken off and uprooted in a swath 200 feet wide and 400 feet long.

First-record Dutch elm disease infection.--A first-record infection was reported from Bedminster Township, Bucks County, Pa., in May. This adds 33 square miles to the Pennsylvania infected zone.

FOREST INSECT INVESTIGATIONS

Ambrosia beetles being studied in New Jersey.--W. D. Buchanan, of the Morristown, N. J., laboratory, reports that adults of the introduced ambrosia beetle, Xylosandrus germanus (Bldfd.), began to be active in May. They began to issue in numbers from rearing containers in the laboratory yard on May 7 and a few days later females were observed entering elm, oak, sycamore, beech, and ash material in the field. Most of this material consisted of limbs broken from the trees in March as a result of a severe ice storm. In all cases the wood had remained moist because of being partly submerged in water or mud. Beetles were also found forming their galleries in exposed roots of beech and an undetermined tree, and boring into elm trees where the bark had been removed by horses or man. Mr. Buchanan has already shown that X. germanus can transmit the Dutch elm disease fungus (Ceratostomella ulmi (Schwarz) Buisman) under controlled conditions. It is rather difficult to rear the insect in the laboratory but barked elm sticks have been successfully attacked this year when kept in battery jars covered with pieces of glass. The lower ends of the sticks rested on wet sand.

Logging to forestall bark-beetle damage.--The Weyerhaeuser Timber Company, encouraged by the success of experiments at Black's Mountain in northeastern California, where the Bureau has demonstrated the possibility of controlling western pine beetle losses through advance removal of high-risk trees, has started a practical test of this control method in their ponderosa pine stands of southern Oregon, according to F. P. Keen, of the Portland forest-insect laboratory. A 1,000-acre tract has been set aside by the company for their first test of this control method. Many thousand additional acres will be covered next year if the method proves successful and economically feasible. Approximately 15 percent of the stand representing trees of the highest beetle risk are being marked for cutting by the Bureau's local forest entomologists. Logging of this timber will be done on a contract basis during the present summer. It is the opinion of the company's officials that this method holds more promise of successful beetle control than the old fell-peel-burn method on which they have been spending approximately $10,000 a year for the last 29 years.

Penetrating sprays to be given practical test.--J. C. Evenden, of the forest-insect laboratory, at Coeur d'Alene, Idaho, reports that a practical test of penetrating sprays as a means of controlling the mountain pine beetle in lodgepole pine was instituted on the Wasatch National Forest, Utah, on June 3. Past work has demonstrated the effectiveness of this treatment on controlled experiments, and this project will serve to test the practical value of the method as a means of control. This test will include the treatment of from 800 to 1,000 trees on an area of approximately 3,000 acres. The technical phases of this project will be under the direct supervision of officers of the Bureau of Entomology and Plant Quarantine, while the administrative phases will be handled by the Forest Service.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Preparations for gypsy moth spraying.--Work preliminary for the gypsy moth spraying season was speeded up early in May so that it could be completed before the foliage developed enough to permit spraying. Central locations in the field were made ready for the storage of spraying equipment and supplies, and the materials were later transported from the central storehouses to these selected locations and distributed as needed to the areas where spraying is to be done. One type of work that must be completed before spraying is started is the laying of hose lines from locations where the sprayers are to be set up at the water source to the most distant points to be sprayed, which may be several thousand feet from the sprayer. An example of the magnitude of this one item of work is the fact that it is estimated that about 145,000 feet of hose will be used in the Pennsylvania area alone, as many infestations to be sprayed are remote from the nearest supplies of water where the sprayers can be placed advantageously. By the end of the month the laying of the hose lines was practically finished, temporary fences around the areas to be sprayed were completed, the approaches to the streams and water holes where sprayers will be set up were repaired and improved, and initial supplies had been moved to the sprayer sites. Fortunately, there appears to be an abundant supply of water in streams and ponds from which water will be drawn during the spraying season. Large numbers of burlap bands were applied to tree trunks at infested locations where no spraying will be done this season. These bands will be turned at regular intervals during the larval season and all caterpillars found taking shelter beneath them will be crushed.

Development of foliage retarded by late spring.--Although the foliage appeared to be fairly well advanced by the middle of May in the valley areas, such as the southern Connecticut River Valley in western New England, the Hudson River Valley in eastern New York, and the Susquehanna River Valley in eastern Pennsylvania, the development of vegetation, in general, indicated a late spring. In wooded country at moderate elevations most of the trees were foliating very slowly, and there seemed to be little likelihood that spraying could be started in many areas before June 3. As oak trees, which are among the most favored food plants of the gypsy moth, are the last to produce leaves, it is usually advisable to delay the spraying of areas where this type of growth comprises a substantial part of the stand until the foliage is at least half developed.

Scouting work completed in Vermont.--Gypsy moth scouting in the barrier zone section of Vermont was drawing rapidly to a close by the middle of May. The work was finished in the areas around assembling cages that attracted male gypsy moths last summer in Leicester Town, Addison County, no indications of the presence of the insect being found. However, a crew continued work in a woodland tract bordering an infested area in Brandon Town, close to the Leicester Town line, as there is a possibility that the Brandon infestation may extend into the woodland in Leicester. Work around assembling cage sites in Lincoln Town was also completed with negative results. All scouting work planned for this fiscal year in Middlebury, Addison County, where more than 200 gypsy moth egg clusters were found and destroyed, was finished, as was the work in the adjoining town of

Bristol. The southern half of the town of Troy, Orleans County, one of the northernmost towns in the State, was scouted without the discovery of any sign of the gypsy moth, and the crew was moved into the adjacent town of Westfield, which was inaccessible until recently because of snow-blocked or muddy roads.

Control of new infestation in Vermont proves difficult.--A gypsy moth infestation was discovered early in May about 1,700 feet from the site of an assembling cage where one male gypsy moth was taken last summer in Salisbury, Addison County, Vt. The growth at the center of the infestation is chiefly medium-sized hardwoods, consisting mainly of paper birch, red and white oaks, beech, and hard maple. The moderate amount of ground litter present can be readily cleaned up, but a bad tangle of slash and other deadwood left from old logging operations covers a large area a few hundred feet from the apparent center of infestation in the same wood lot.

Barbwire fences erected in preparation for spraying.--Government-owned barbwire fences were removed from areas which were sprayed last year in Shrewsbury, Rutland County, Vt., and the wire was used in erecting temporary fences around infested woodland in Addison County, where spraying will be done during the coming season. Some of the woodland where spraying will be done in Bristol and Middlebury, in Addison County, either embraces or is surrounded by areas where young stock will be pastured until fall or early winter. In such cases, stout temporary fences will be erected around the areas to be sprayed to prevent the livestock from grazing on the poisoned vegetation. These fences will be patrolled at frequent intervals, especially after storms, and any damage resulting from windfalls, lightning, or tampering will be repaired at once.

Two new gypsy moth infestations found in Connecticut.--Two new gypsy moth infestations were found in the town of Cornwall, Litchfield County, Conn., early in May. One of these colonies is located at a relatively high elevation in growth largely favored as food plants by the gypsy moth. Work at this spot was pressed in order to determine the advisability of treatment by spraying.

Planned treatment work at Southbury infestation not completed.--Although scouting and treatment work at the gypsy moth infestation situated on the Southbury-Roxbury Town line in New Haven and Litchfield Counties, Conn., was conducted in an intensive manner in order to locate and creosote a maximum number of egg clusters before hatching becomes general, it became apparent early in May that this phase of the work would have to be discontinued before entire completion. It was necessary to withdraw some of the men from the scouting and treatment work and assign them to the building of temporary fences around the infestation in preparation for the approaching spraying season. A special type of fence consisting of 11 strands of barbwire, placed about 4 inches apart and supported by posts every 3 feet, was erected at this infestation so that sheep pastured on adjoining land cannot force the strands apart and crowd into the poisoned area.

Preliminary gypsy moth work in Pennsylvania completed.--The general plan of scouting work for the fiscal year in Pennsylvania has been followed closely and will be practically completed by the time spraying is begun. The work was so far advanced that, by the middle of May, several crews of laborers were engaged in applying burlap bands to trees at infested locations where no spraying is planned for this year. These bands will be patrolled regularly and all caterpillars found under the bands will be destroyed. Other crews were assigned to the erection of temporary fences around woodlands where spraying will be done. Some of these fences were completed in sections where fenced pastures are rarely seen and where livestock is permitted to roam over the countryside at will.

Residential spraying started in Pennsylvania.--Residential spraying for the gypsy moth in Pennsylvania was begun on May 21, several days later than the work is usually started, with six machines operating. Each sprayer was closely followed by another loaded with clean water, which was used to wash the lead arsenate solution from buildings, fences, garden furniture, and other material. Every precaution was exercised to avoid damaging property or injuring shrubs and young plants in gardens. Work was first started in sections where birches, Norway maples, and Carolina poplars predominated, as the foliage on these trees was more advanced than on other species. Meanwhile, employees were engaged in distributing supplies, laying out hose lines, finishing the construction of temporary fences, and improving the approaches to streams and water holes where sprayers will be set up in other sections of the quarantined area. This work was practically completed by May 25.

C. C. C. gypsy moth work during May.--Approximately 7,375 6-hour man-days was used by the C. C. C. during May on gypsy moth work under the supervision of this Bureau in the area east of the barrier zone. Heavy rains during the month were responsible for much time lost to gypsy moth work, while the training of enrollees in fire fighting caused further reduction. The men were used mainly on scouting, creosoting, thinning, and burning operations until the hatching of the egg clusters was practically complete. Owing to a decrease in the regular Federal gypsy moth force, it was necessary that C. C. C. foremen transport the spraying machines and hose from the storehouse in Greenfield, Mass., to the field. This was done and the hose lines had been laid in readiness for operation by the end of the month. Also fences, roads, and water holes were prepared for the spraying season. Actual spraying work was started at several locations east of the barrier zone in Massachusetts and Connecticut on May 27. As there was considerable variation in the extent of development of white oak foliage, spraying was started in areas where there was a minimum amount of this type of growth in regions where the foliage was not sufficiently developed. The late season permitted the continuance of scouting work in Vermont until the end of the month, and the crews continued to find severe infestations in the Rockingham-Westminster-Grafton-Springfield areas. As no spraying equipment is available for C. C. C. gypsy moth spraying in Vermont, the gypsy moth crews will be assigned to burlapping and thinning work during the larval season.

Gypsy moth hatching retarded.--Gypsy moth hatching started late this season and was spread over an unusually long period. Emergence was first noticed by C. C. C. foremen in the vicinity of Westfield, Mass., on May 8, and very heavy hatching was observed in the Rockingham section of Vermont as late as May 23.

C. C. C. spraying preparations.--Scouting work in Massachusetts and Connecticut has disclosed that the supplies, equipment, and supervision available are not sufficient to cover all territory where spraying could be done advantageously, and it will be necessary to confine the spraying operations to the areas considered most dangerous. Nine Bureau-owned sprayers, which were loaned to the C. C. C. for gypsy moth spraying work, were distributed and set up ready to start operations. Four of the machines will be used east of the barrier zone in Massachusetts and five will operate in Connecticut. The work in Connecticut will be augmented by two additional sprayers loaned by the State. The sprayers in Connecticut will operate on a double-shift basis after June 3, and the purchase of additional lead arsenate and fish oil by the C. C. C. in Massachusetts will permit double shifts on three of the Massachusetts sprayers. The work in Massachusetts will be done entirely by C. C. C. foremen and crews, and regular Federal employees have instructed the spray-pump operators and nozzlemen as to the proper manner to carry on this work. Spraying in Connecticut will be done cooperatively by the C. C. C. and the State gypsy moth office. This office has loaned a considerable part of its force to aid the C. C. C. spraying work, and the pumps will be operated by State employees, while C. C. C. enrollees will man the nozzles. Through further cooperation by the State forester of Connecticut, experienced C. C. C. gypsy moth foremen and enrollees have been transferred from camps where no spraying is to be done this year to other camps where spraying work is planned. This realignment of foremen will place C. C. C. foremen who are familiar with gypsy moth spraying in charge of most of the spraying crews. In a few instances where this arrangement is not possible, experienced State foremen will direct the crews through C. C. C. leaders acting as foremen. Excellent cooperation has also been given by many property owners.

PLANT DISEASE CONTROL

Stem rust in Mexico in the spring of 1940.--The following summary of the stem rust situation this year has been compiled by E. C. Stakman, in charge of the Federal rust laboratory at St. Paul, Minn.: "Stem rust was found on wheat in all major wheat-growing areas visited in Mexico late in March and early in April. In southern Mexico, including the States of Puebla, Mexico, Michoacan, Jalisco, Queretaro, and Guanajuato, the development of rust was somewhat sporadic, its prevalence and severity varying greatly in different localities and in different fields in the same locality. Owing to an unusually cold, dry winter, the availability of irrigation water appeared to be an important factor in this uneven distribution of rust. As in previous years, early sown fields were most heavily rusted and there was relatively little evidence of extensive spread from fields in which rust survived the winter. Identification of parasitic races of wheat stem rust from southern Mexico is in progress. Preliminary evidence indicates predominance of race 38 and race 59, as in previous years, although there are some indications of small amounts of races not hitherto present or prevalent in that region. In northern Mexico, including the States of Nuevo Leon and Coahuila, rust development was extremely local. Only a few pustules were found in the Torreon area early in April and rust was still light the third week of May. In the Saltillo area there was no rust or relatively little in most fields early in April, but eastward near Ramos Aerizpe some early fields were heavily rusted. Just south of Monterrey and also near Sabinas Hidalgo, about 80 miles south of the international boundary, some fields were heavily rusted. Heavy rain late in March favored abundant development of rust in this area, and spores undoubtedly were blown into Texas from it. Had this rain not occurred at that particular time, there would have been only a moderate amount of rust. Preliminary results of physiologic race identifications from northern Mexico indicate that the situation again is different in general from that in southern Mexico."

Stem rust situation in Southern States.--There is evidence that overwintering of the uredial stage in Texas was rare during the winter of 1939-40. Apparently, however, a few spores were blown in from Mexico at various times during the winter and considerable numbers were blown in during the spring. This conclusion is reached by correlating the appearance of rust with the results of spore trapping. Because of the very dry fall and winter in much of the hard red winter-wheat area, there is much late wheat, as was true in 1935. Frequent rains this spring were favorable to rust development and there is likely to be considerable damage. In a fan-shaped area extending northeastward and northwestward from Dallas, Tex., considerable damage already has been done. The aecial stage of rust on barberries was prevalent from Pennsylvania and the Virginias to Minnesota and Iowa by the second half of May, and many collections have been obtained for physiologic race identification.

Wind dissemination of spores.--Slides exposed at many stations in the Mississippi Basin are being examined as rapidly as possible. Considerable numbers of spores were blown into the region around Dallas, Tex., during the first week of April and larger numbers at various times later in the month. By the 21st of April a moderate number of spores were caught at Wichita, Kans.

Physiologic race survey.--There are now on hand 238 uredial collections, of which 46 have been identified. There are 44 aecial collections, all of which are in culture but none of which have been identified. About 150 of the uredial collections are now in culture.

The production of new races of stem rust on barberry bushes.--From a study of rust produced on barberries by inoculating with teliospores and from the results of crossing experiments, it is becoming increasingly evident that Puccinia graminis tritici, inferentially other varieties also, comprise an indefinite number of parasitically different biotypes. At least some of the recognized and numbered races clearly comprise several biotypes, with slight to rather pronounced differences in virulence to wheat varieties. It is significant that the resistance of certain varieties to certain physiologic races may vary greatly with environmental conditions. Although the importance of eradicating barberries to prevent the development of new races and to help reduce the number now in existence has been emphasized repeatedly, observations and experiments during the last few months impel to still greater emphasis.

More Berberis canadensis found in Indiana.--Stanley Castell, State leader of barberry eradication in Indiana, reports: "A new location of Berberis canadensis has been found in Washington County. These bushes were reported by a boy who learned about barberry from a lecture in his school by an agent on the barberry-eradication campaign several years ago. This find is the third one reported by this boy. The bushes were salted on May 24, 1940."

Barberry bushes found in North Dakota, South Dakota, and Montana.--According to G. C. Mayoue, G. W. Eade, and Ivar Twilde, barberry bushes have been found in North Dakota, South Dakota, and Montana since field work was resumed in these States about April 1. In North Dakota a former security-wage employee reported the presence of barberry bushes near Sanger, Oliver County. A check of the report resulted in the eradication of 16 large barberry bushes and many seedlings. According to the owner of the property, the barberries were the remainder of a hedge of more than 100 bushes planted by his mother in 1904. The farm on which the bushes were found is located about a mile from the Missouri River and it is expected that wild bushes may be found in adjacent wooded areas. In Montana barberry bushes were found in May in Carbon and Missoula Counties. In South Dakota a crew of security-wage earners, under the supervision of a technically trained supervisor, have found bushes in Fall River County.

White pine plantations will be pruned to reduce rust loss.--Parts of 2 white pine plantations on the middle fork of Big Creek near Haugan, Mont., are scheduled for pruning by C. C. C. workers this fall and winter in order to reduce the loss from blister rust that invaded the areas prior to Ribes eradication. These plantings, which are about 15 years old, average about 200 planted and native white pines per acre in a strip 10 chains wide along the lower slope where the work will take place. In addition, there is a scattering of natural larch and Douglas fir which, with the white pine, will develop into a full ground cover within the next decade. The plan, as approved by Elers Koch, chief of timber management for region 1, is as follows: (1) Prune branches from lower third of all white pines; (2) remove all trees with trunk cankers; (3) remove cankered branches from the upper two-thirds of the crowns; (4) release all white pines that are crowded by other conifers, willow, and minor brush. From general observation it appears that removal of the lower third of all crowns will destroy 95 percent or more of the cankers on the area. Probably not more than 2 percent of the trees are doomed by cankers already in the trunk, so the present loss is very light. Cankers that would eventually reach the trunks and kill, however, constitute a high percentage of the total, so it is estimated that this relatively low-cost pruning job will save from 50 to 75 percent of the white pine. Two other plantations in this general vicinity are also under consideration for rust-loss-reduction treatment.

First infected limber pine in Northwest.--For the purpose of checking on blister rust invasion of the Savenac Nursery at Haugan, Mont., a row of western white pine is maintained in the odd-stock plot on the old nursery site. A small amount of infection, probably from a few nearby Ribes removed during rework in 1938, was found recently on two of these trees. Further inspection on May 31 by nurserymen J. Fox, C. H. Johnson, and E. L. Joy resulted in the location of five additional cankers on western white pine and three on limber pine in an adjacent row. The latter consisted of one fruiting canker and one incipient canker on 1936 growth and one on 1937 wood. Although occurring on nursery-grown stock within the nursery area, this constitutes the first reported infection of *Pinus flexilis* in the Northwest.

Pine infection found in Iowa County, Wis.--Blister rust infection on white pine was reported for the first time in Iowa County, Wis., this spring. The canker was found on 1936 wood. Of some 200 trees examined, rust was found on only 1 tree about 3 feet in height. *Ribes cynosbati* and *R. missouriense* were growing in the immediate vicinity. This location is approximately 28 miles north of the Illinois-Wisconsin State line and the most southern infection of pine found in Wisconsin.

COTTON INSECT INVESTIGATIONS

Cotton root aphids.--F. F. Bondy and C. F. Rainwater, Florence, S. C., conducted experiments during April and May against the cotton root aphids through control of the attending cornfield ant *Lasius* sp. . Three species of root aphids were found on cotton but every case of severe injury observed was caused by *Trifidaphis phaseoli* (Pass.) and this is by far the most important species on cotton. Vetch, clover, and cowpeas appear to be the principal host plants of this species. A few aphids were on the roots of Austrian peas during the winter but none were found this spring and it does not appear to be a favorite host. Cotton following corn planted to cowpeas is often heavily infested. A great deal of interest has been shown by biologists of the Soil Conservation Service in planning crop rotations to reduce aphid damage to cotton. The ant poisons tested this season were thallium acetate, thallium sulfate, and tartar emetic in sweetened baits. These were distributed in Argentine ant bait cans, or absorbed in sawdust and cottonseed hulls. A small handful of the latter was placed about every 10 feet on each third row of cotton, or at the rate of 1.5 to 2 gallons of sirup and 8 pounds of cottonseed hulls or sawdust per acre. Good reductions in the number of ant hills and the aphid injury to cotton were obtained with all the baits. The tartar emetic-cottonseed hull bait will likely be the most practical, because of its greater safety and the availability of materials. Its effectiveness is lost after a few days and the bait placed in cans would remain effective over a longer period, although in either case more ants are attracted within the first 24 hours. It was also observed that more ants attended the baits on bright warm days following cool nights and more following a warm rain than during a dry spell.

Effect of boll weevil control insecticides on leaf aphids.--In many cases *Aphis gossypii* Glov. increases to injurious numbers following the use of calcium arsenate for boll weevil control and complicates the interpretation of results. Studies were made at Tallulah, La., by R. C. Gaines, M. T. Young, and G. L. Smith to obtain information on the effects of certain insecticides used for boll weevil control on the aphid infestation and the injury caused by the aphids. Aphid counts were made by examining 1 square inch of leaf area on the fourth leaf from the top of 100 cotton plants per plot. These records were made without removing the leaves from the plants, on 5 or 6 dates during the period July 26 to September 1. In plots dusted with calcium arsenate containing 10.3 percent water-soluble arsenic pentoxide, by the New York method, an average of 1.95 aphids per square inch were found; dusted with 4.6 percent water-soluble calcium arsenate, 1.84 aphids; dusted with 0.5 percent water-soluble calcium arsenate, 1.40 aphids; check, 0.45 aphid per square inch. The plots treated with the calcium arsenate containing a low percentage of water-soluble arsenic yielded 66 pounds of seed cotton per acre more than the plots treated with the high percentage of water soluble. The significant difference in aphid populations may be partly responsible for the difference in yield, since cage tests have indicated that calcium arsenate containing a high percentage of water-soluble arsenic was more effective and toxic against the boll weevil than one containing a low percentage. In another series of experiments plots dusted with di-calcium arsenate which was practically pure $CaHAsO_4.H_2O$, there were an average of 3.65 aphids per square inch of leaf area; dusted with a calcium arsenate containing 3.4 percent water-soluble, 2.32 aphids per square inch; dusted with a 7-percent paris green and 93-percent calcium arsenate mixture containing 2.6 percent water-soluble arsenic, 2.17 aphids; dusted with a calcium arsenate containing 0.35 percent water-soluble arsenic, 1.98 aphids; dusted with basic copper arsenate, 1.27 aphids; and check, 0.48 aphid per square inch. The yields from these plots fall into two groups, those from the di-calcium arsenate and the paris green-calcium arsenate mixture being lower than the check and the 2 calcium arsenates and basic copper arsenate higher than the checks. The difference between the average yields in the 2 groups was 148 pounds of seed cotton per acre. The difference between the lowest yield, which was from the di-calcium arsenate, and the highest, which was from the basic copper arsenate, was 249 pounds per acre. Aphid infestations appeared to partly explain these differences in yield as there were light boll weevil infestations in all plots and only small differences in boll weevil infestations between the various treatments. The coefficient of correlation between the average number of aphids per square inch of leaf area and yield, with checks included, was -0.52 (P more than 0.10) and without the checks the coefficient was -0.92 (P approximately 0.02). The correlation coefficient between the average number of aphids per square inch and net mortality of boll weevils in cages was +0.99 (P more than 0.01). These coefficients leave little doubt as to the relation between aphid infestations and effectiveness of insecticides for boll weevils and between aphid infestation and yields. A 3-percent nicotine sulfate-lime dust for aphid control and a calcium arsenate containing 3.5 percent water-soluble arsenic for boll weevil control were used in a factorial experiment to determine effect of aphid control on yield, the effect of boll weevil control on yield, and the effect of a combination of both aphid and boll weevil control on yield. A highly significant average increase of 190 pounds of seed cotton per acre was caused by boll weevil control, with and without aphid control, while a nonsignificant average increase of 90 pounds was caused by aphid control, with and without boll weevil control. In the absence of aphid control a nonsignificant average of 140 pounds per acre was caused by boll weevil control, while with aphid control the average increase of 230 pounds was significant. In the absence of boll weevil control the average increase caused by aphid control was 40 pounds per acre, while with boll weevil control the average increase was 130 pounds, both differences being nonsignificant. A highly significant average increase of 270 pounds per acre was caused by the combination of both boll weevil and aphid control. In other experiments comparing calcium arsenate, sulfur, and mixtures of calcium arsenate and sulfur, no significant differences were found between the averages of the aphid populations in the checks and the sulfur-treated plots or between the calcium arsenate and calcium arsenate-sulfur mixture plots, which indicate that sulfur apparently had little or no effect on the aphid infestation. The significant differences between numbers of aphids in plots treated with calcium undiluted or diluted with sulfur and where no calcium arsenate was used, indicated that calcium arsenate was the only material used in this series which greatly affected aphid infestation.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Bloom inspection.--The principal method for obtaining information in regard to the status of pink bollworm infestation is through gin-trash inspection. Bloom inspection is usually done for a short period each year early in the season in order to obtain advance information in regard to the existence of infestation. At the close of the second week in May a considerable acreage of 1940 cotton plantings was beginning to put on blooms in all 4 of the lower Rio Grande Valley counties and in the Matamoros area of Mexico, and cooperative bloom inspection was begun on May 13 by the Control and Research Divisions of this Bureau and the Defensa Agricola of Mexico. The first pink bollworm was found in a cotton bloom in the Matamoros area on May 13, and in Cameron County, Tex., on May 15. At the close of May a total of 852,262 blooms had been inspected from 6 south Texas counties and from the Matamoros area of Mexico, resulting in the finding of 79 pink bollworms. Of the total number of pink bollworms found, 46 came from the Matamoros area through the examination of 282,202 blooms; 32 came from Cameron County through examination of 417,464 blooms; and inspection of 133,483 blooms in Hidalgo County yielded 1 specimen. Bloom inspection in the other 4 Texas counties, namely, Willacy, Starr, Jim Hogg, and Duval, gave negative results as to pink bollworm infestation.

Inspection of okra in lower Rio Grande Valley.--Following the finding of a rather widespread pink bollworm infestation in okra fields in the lower Rio Grande Valley area at the close of the 1939 cotton season, the State of Texas issued a proclamation establishing rules and regulations pertaining to the production and movement of okra, designed to prevent spread of infestation through this medium, and Federal Quarantine No. 52 was also amended to include okra in the list of products under regulation on account of the pink bollworm. The spring okra-shipping season in the lower valley opened around the first of May, and there was unusual activity in connection with okra plantings during the period. This was due, to a large extent, to the very good price being paid for this commodity, resulting in all available okra being gathered and sold. At the close of the month 137 dealer-carrier permits had been issued to valley growers, involving approximately 400 acres. Since the beginning of okra inspection, around the first of May, 116,145 forms have been examined, which is a great deal more than the total of all inspections in last fall's okra crop, with negative results as to pink bollworm infestation.

Destruction of sprout cotton in the lower Rio Grande Valley.--In connection with the control measure restricting the planting of cotton in the lower Rio Grande Valley counties to the period February 20 to April 20, it has been equally as important to prevent, insofar as possible, the blooming of sprout or volunteer cotton during the off cotton-growing season, in order that emerging pink bollworm moths would find no material on which to maintain themselves and build up infestation prior to the fruiting of the 1940 cotton crop. To prevent the fruiting of such plants, which usually are scattered, it is necessary to remove them by grubbing. No grubbing was done in May in fields in which 1940 cotton was planted, as by the beginning of the month the 1940-planted cotton was as far advanced as any remaining sprout cotton; however, some work was done during the period on abandoned acreage and along canal banks and drainage ditches. The removal of sprout cotton was discontinued on all acreage at the end of May. Since this activity was started on January 2, 1940, there has been a total of 94,060 acres of cotton land grubbed. In addition to this, sprout cotton was removed from 470 miles of canals and drainage ditches.

Destruction of stub cotton in Arizona.--As the result of cooperative efforts of the State of Arizona, the Bureau of Entomology and Plant Quarantine, and the Agricultural Adjustment Administration, regulations were promulgated by the Secretary of Agriculture in March 1940, through the A. A. A., requiring cotton growers throughout the State of Arizona having A. A. A. allotments to destroy all volunteer or stub cotton prior to May 10, in order to be eligible for 1940 conservation payments. This regulation has for its purpose the creation of a host-free period for the pink bollworm until the 1940-planted cotton comes into bearing, during which period all emerging moths will die in the absence of any cotton fruit, and has as its ultimate objective the eradication of the pink bollworm from Arizona. A similar provision was included in the A. A. A. 1939 conservation program, but included only the eastern portion of the Salt River Valley and the Santa Cruz Valley. The existing regulation also differs from the previous one in that it will remain in effect until revoked. The stalk-destruction program was carried to a very successful conclusion, and at the close of May 10, all growers having an A. A. A. base were in compliance with the Secretary's regulation. There did remain, however, approximately 800 acres having no A. A. A. allotment on which stub cotton was growing. Most of this acreage was made up of scattered plots on the U. S. Indian Reservation, from which there appeared to be no authority to effect the removal of stub cotton. Therefore, in order to safeguard the program, it was necessary to destroy this cotton with Bureau funds, and at the close of May sprout cotton had been removed from practically all of this acreage.

Control program in the Big Bend.--A very marked reduction in pink bollworm infestation in the heavily infested area of the Big Bend of Texas and Mexico was obtained under a joint international program carried out for that region during 1938 and 1939. Therefore, in order to maintain the reduction effected, and with the hope and expectation of further reducing the infestation, agricultural officials of both countries agreed on a similar program for the 1940 crop season for the Presidio-Ojinaga areas of the Big Bend. These control measures consist of the early clean-up of cottonfields after harvesting, coupled with delayed planting and the elimination of sprout cotton for the purpose of creating a host-free period for pink bollworm moths until the peak of spring emergence is over. No cotton was planted in the Presidio Valley prior to April 20, in compliance with a State order to that effect, and all planting was expected to be completed around May 10. However, on May 8 a severe hail and rainstorm occurred in that area, making it necessary to replant about 700 acres of cotton. Despite the fact that replanting was not completed until around the latter part of the month, unusually cool weather during May so retarded the growth of the earlier planted cotton that apparently it will reach maturity much in advance of the replanted cotton. While there was not a great deal of sprout cotton present in the Presidio Valley, scattered plants were found in nearly every field. At the end of May, however, all sprout cotton had been removed from the valley, with the exception of a small acreage which had not reached a favorable stage of development for removal. Similar control measures in the Ojinaga area of Mexico are being very successfully carried out, and the inspector in charge of that area reports excellent cooperation on the part of the farmers in complying with the order for the removal of sprout cotton.

Wild-cotton eradication in Florida.--An effort has been under way for a number of years to eradicate the pink bollworm from southern Florida through the destruction of its host plant, wild cotton, and thus prevent its spread into domestic cotton plantings to the north. Wild-cotton eradication in Florida is now nearing completion for the season, as, on account of unfavorable climatic conditions, it is not possible to carry on this work after the middle of June. At the close of May practically all of the area had been cleaned twice this season and in a considerable portion of the area third cleanings were drawing to a close. During the period approximately 3,390 acres was covered, resulting in the finding of 164 plants with mature bolls, 15,044 seedling plants, and 244 mature plants. During the month incidental inspections were made of 130 wild-cotton squares, 83 blooms, and 2,056 bolls. Most of the bolls were collected from the Dade County mainland, east of Cape Sable, the examination of which resulted in the finding of 2 specimens of the pink bollworm. Inspection of all other material gave negative results.

Thurberia-plant eradication.--The Thurberia-plant eradication project was inaugurated in 1935, following the discovery that these plants serve as a host to the Thurberia weevil, from which this insect was making its way to domestic cotton plantings in southern Arizona. The area involved in the original program for the removal of Thurberia plants included all of the Tortillita Mountains and the southern slopes of the Santa Catalinas. The Tortillita Range has been covered twice, and a recheck has been in progress for some time in the Santa Catalinas. During May a total of 1,976 man-days was expended on this work, resulting in the location and destruction of 21,591 plants from 4,320 acres.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Relation between viability of wireworm eggs and relative humidity.--As a result of recent experiments, E. W. Jones, of the Walla Walla, Wash., laboratory, reports that when eggs of the Pacific coast wireworm, the western field wireworm, and the sugar beet wireworm were exposed to relative humidities ranging from 80 to 100 percent, at a temperature of 68° F., the eggs shrunk and collapsed after 10 days' exposure to a relative humidity of 99 percent. The eggs of Limonius canus failed to hatch at a relative humidity of 98 percent and only 1 egg out of 50 hatched at a relative humidity of 99 percent. The eggs of L. infuscatus and L. californicus hatched when exposed to a relative humidity of 99 percent and the resulting larvae survived a 10-day exposure to this humidity. In general, it was found that of the 3 species the eggs of L. canus were the most susceptible to atmospheric conditions below the saturation point. The results of these experiments indicate that the present recommended practice of drying out wireworm-infested soils through the medium of withholding irrigation water or by growing a crop that requires large quantities of soil moisture affects not only the wireworm larvae but also the eggs, and that, in this event, *L. canus* would apparently exhibit the least resistance to the harmful effect of a deficiency in soil moisture on subsequent wireworm population.

Derris-pyrethrum-sulfur dust mixture effective against bean leaf beetle and associated insects on beans.--L. W. Brannon, of the Norfolk, Va., laboratory, reports that preliminary results of an experiment conducted for the control of the bean leaf beetle on snap beans showed that a derris-pyrethrum-sulfur dust mixture is highly toxic to this insect, one application of the dust mixture resulting in the death of approximately 91 percent of the insects at the expiration of a 24-hour period after the insecticide was applied. The results obtained with this insecticide are of considerable importance in view of its value as an all-purpose dust mixture for the combined control of several species of insects commonly attacking beans, including the Mexican bean beetle, the bean leaf beetle, the potato leafhopper, the common red spider (*Tetranychus bimaculatus* Harvey), and for the prevention of powdery-mildew disease. Examinations 7 days after the insecticide was applied demonstrated a reduction of approximately 60 percent in the number of bean leaf beetle adults on plots treated with this material, as compared with the population of this insect on untreated plots grown under comparable conditions.

Limitations in fumigation of mushroom beds with hydrocyanic-acid gas.--A. C. Davis, of the Beltsville, Md., laboratory, reports that the fumigation of bearing mushroom beds with hydrocyanic-acid gas, generated from calcium cyanide at intervals ranging from 6 to 8 days, and with dosages ranging from 2½ to 4 ounces per 1,000 cubic feet, did not damage the spawn, as demonstrated by the fact that more mushrooms were produced in the treated sections than in an untreated section grown under comparable conditions. At dosages exceeding 2½ ounces per 1,000 cubic feet it was found that some browning of the mushrooms occurred, as well as at slightly lower dosages. Temperatures above 55° F. were found to be less important than moisture, as a factor affecting the burning or browning of the mushrooms. The peak concentration of the hydrocyanic-acid gas was found to range from 0.153 mg./L to 0.62 mg./L, a difference of nearly ½ mg./L, with the same dosage of 2½ ounces per 1,000 cubic feet, owing to differences in moisture and humidity which, in the ordinary mushroom house, are difficult or impossible to control accurately. Based on the results of these experiments, it appears that under commercial conditions the material used in these experiments is too erratic to be entirely dependable, although the commercial practice of using 2 ounces of calcium cyanide per 1,000 cubic feet would probably not result in appreciable damage to the mushrooms under average conditions, even though it is the opinion of some mushroom growers that fumigation with hydrocyanic-acid gas generated from calcium cyanide is harmful to the mushroom spawn, and several growers have reported that the mushrooms upon the beds were severely damaged by the treatment.

Asparagus beetle parasite shipped from Washington to California.--During the month of May, B. J. Landis and his associates at the Puyallup, Wash., laboratory sent to the California Citrus Experiment Station at Riverside, Calif., 2,000 adults of Tetrastichus asparagi Crawf., a parasite of the asparagus beetle, for release in the asparagus fields of Orange County, Calif., where the eggs of Crioceris asparagi were numerous. Additional shipments are to be made from Puyallup to Riverside later in the season.

INSECTS AFFECTING MAN AND ANIMALS

Cushing to take charge of Menard, Tex., laboratory, center of screwworm and other work.--In order more effectively to coordinate the research on screwworms and to utilize the facilities available at the ranch experiment station of the Bureau at Menard, Tex., all work on screwworm problems is being centered at that point, and E. C. Cushing has been placed in charge. The investigational work on the screwworm problem, which has been carried on at Dallas, Tex., under the direction of E. W. Laake, is being transferred to Menard, together with some of the personnel. Mr. Cushing will also direct such work as is continued at Uvalde, Tex. The laboratory at Sonora, Tex., where investigations of goat and sheep lice, sheep head bot, amd sheep tick have been carried on, is being discontinued and O. G. Babcock will continue this work at Menard.

Stage to become assistant Division leader.--On July 1, H. H. Stage, in charge of the Portland, Oreg., office will report to Washington to fill the vacancy of assistant division leader occasioned by Mr. Cushing's transfer.

Longevity of Aedes eggs.--In 1935 Mr. Stage placed soil containing eggs of Aedes vexans (Meig.) and A. lateralis (Meig.) in a screened cage out of doors. The eggs had been oviposited in 1934 or earlier. On the first of June, and again on the first of September of each year since installation, samples of this soil have been tested for larval hatch and larvae of both species have appeared at each test. The June 1940 test has just been completed and the mean average hatch per sample was found to be 14.3. The previous tests in June showed the following averages: 1935, 370.0; 1936, 232.8; 1937, 62.5; 1938, 104.2; 1939, 159.5.

Breeding studies of Stomoxys.--At the Panama City, Fla., laboratory E. E. Rogers tested several sea flora as breeding media for Stomoxys but only one proved satisfactory. This was composed of a mixture of two green marine grasses tentatively determined as Halodule wrightii and Ruppia maritima. This is the first green material of this type observed on the beaches since work was started at this laboratory last September. A high percentage of emergence took place from this material.

Overwintering of Dermacentor variabilis eggs.--At the Martha's Vineyard laboratory Carroll N. Smith, in the course of observations on the duration of the developmental stages of the American dog tick under outdoor conditions, found one egg mass in which hatching had begun last fall but was stopped by winter weather and resumed in May. Three groups of larvae in which winter had interrupted molting resumed molting but no new lots of eggs or larvae were observed to start hatching or molting in this month.

Survey of malaria research.--A meeting in Atlanta on May 1 of several investigators working in the field of malaria was attended by W. V. King. This was preliminary to a more general conference called by the Surgeon General of the U. S. Public Health Service in Atlanta on May 29-30, which was attended by representatives of most of the organizations doing research on malaria and by several State health officers. F. C. Bishopp and W. V. King represented this Bureau. The present needs in the field of malaria research were discussed from many angles and a motion was adopted to conduct a survey of the research work on malaria now being carried out by different institutions and to determine the facilities available for such work. An outline was also prepared and adopted covering the various lines of research which, it was believed, should be given special attention and included in a coordinated program on this problem.

Pyrethrum emulsion and sand fly larvae.--J. B. Hull reports that during the last month at the St. Lucie, Fla., laboratory an emulsion composed of pyrethrum, kerosene, and soap, such as is recommended for mosquito larvae, was tested for its effect on sand fly larvae. The emulsion was made at the strengths recommended for mosquito larvae, except that the pyrethrum extract used contained 2 pounds of pyrethrum powder to 1 gallon of kerosene, instead of 1 pound of pyrethrum powder to 1 gallon of kerosene. Tests made with extract containing 2 pounds of pyrethrum powder to 1 gallon of kerosene, which is twice as strong as emulsion used for mosquitoes, gave a kill of 100 percent of sand fly larvae in 24 hours at a dilution of 1 to 10,000. At a dilution of 1 to 100,000, this gave no kill in 24 hours, although the larvae appeared very sluggish and were irritated.

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.--A living larva of the fruitfly *Anastrepha mombinpraeoptans* Sein was intercepted at New York on July 20, 1939, in a mango fruit in baggage from Puerto Rico. Living specimens of the pentatomid *Mormidea collaris* Dall. were taken at Laredo, Tex., on February 24, 1940, on orchid plants (*Cattleya*) in baggage from Mexico. A living larva of the East Indian bean pod borer (*Maruca testulalis* Geyer) was taken at New Orleans on December 16, 1939, in a string bean pod in ship's stores from Dominican Republic. Living specimens of the mealybug *Trionymus peregrinus* (Green) were taken at Washington, D. C., on November 8, 1939, on amaryllis bulbs in cargo from the Netherlands. A living specimen of the lygaeid *Sisamnes contractus* Dist. was taken at Nogales, Ariz., on March 5, 1940, on tomato in cargo from Mexico. A living adult of the weevil *Anacentrinus blanditus* Csy. was taken at Brownsville, Tex., on January 15, 1940, on lettuce in baggage from Mexico. A living specimen of the lygaeid *Acroleucus vicinalis* Dist. was taken at Galveston, Tex., on September 27, 1939, with banana debris in cargo from Mexico. Living specimens of the scale insect *Phenacaspis fujicola* Kuw. were taken at Seattle, Wash., on December 22, 1939, on stems of *Wisteria* sp. in cargo from Japan. Eight living larvae of the East Indian bean pod borer (*Maruca testulalis*) were taken at Mobile, Ala., on March 2, 1940, in string beans in ship's stores from the American Virgin Islands. An adult of the cerambycid *Pogonocherus hispidulus* (Piller) was taken at San Francisco on March 7, 1940, in a cutting of Ficus sp. in cargo from Italy. A living specimen of the alticid Diphaulaca sp., near aulica (Oliv.) was found in the cabin of an airplane from Costa Rica at Brownsville, Tex., on May 23, 1940. H. S. Barber states that this species injures beans in Mexico and Central America. A very similar South American species, D. aulica (Oliv.), also attacks beans and its name has been much used in error for this species. A living adult of the mirid Creontiades pallidus (Ramb.) was intercepted at New York on January 13, 1940, on escarole in stores from Italy. It is reported as being injurious to cotton, lettuce, and other plants in Egypt. Living specimens of the aphid Pineus borneri Annand were intercepted at New York on June 27, 1939, on Pinus koraiensis in furnishings from Japan. This aphid is reported as an injurious insect in the Far East. Living specimens of the citrus blackfly Aleurocanthus woglumi Ashby were intercepted at Chicago on March 16, 1940, on lime leaves in mail from Jamaica. Living adults of Cylas puncticollis Boh. and living larvae and pupae identified as Cylas sp., probably C. puncticollis, were intercepted at Boston on May 17, 1940, in sweetpotato from Sierra Leone, Africa (see News Letter, v. VII, No. 6, p. 34).

Pathological interceptions of interest.--Interesting interceptions for which determinations were received during the month included Acrospeira mirabilis B. & Br. on chestnuts from Japan, on December 27, 1939, at Seattle; Cercospora ipomoeae Wint. on Ipomoea pescaprae from Mexico on December 26, 1939, at Brownsville; Coryneum microstictum B. & Br. on Kerria japonica from Japan on January 30 at Seattle; Coryneum sp., unlike the two species reported (C. rhododendri Schw. and C. triseptatum Peck.), on rhododendron from Canada on January 22 at Seattle; Cryptospora (longispora Servazzi?) on Araucaria excelsa seed from New Zealand on December 26, 1933, at Washington; Eucephalobus sp. (very close to E. laevis Thorne) on Manihot esculenta roots from Cuba on April 9 at New York; Mycosphaerella (musae (Speg.) Syd.)? on Musa sp. from Brazil on February 29 at Washington; Phyllachora gratissima Rehm. on avocado leaves from Mexico on April 26 at El Paso; Puccinia magnusiana Koern. on seeds and stems of Phragmites communis on April 23 at New York; Sclerotium sp. on Nephrodium glabratum from New Zealand on February 26 at San Francisco; Septoria nodorum Berk. on wheat-straw packing from England on May 23 at New York; Septoria drummondi E. & E. on Phlox drummondi cuttings from Bermuda by clipper on May 12 at New York; Septoria taraxaci Holl. on May 10 at New York on dandelion leaves in stores from Italy; Uromyces dolicholi Arth. on January 29, at New York on pigeonpea leaves in baggage from Cuba; and Zygosporium oschioides Mont. on palm ties on onions in cargo from Cuba on April 23 at New York.

DOMESTIC PLANT QUARANTINES

Chinch bug control begun.--From appropriations made for the control of emergency and incipient outbreaks of insect pests and plant diseases, limited funds have been made available for preliminary purchases of creosote for the control of chinch bugs in the infested States. A small field office force has been established in Chicago, Ill., with W. E. Dove temporarily in charge, located at 1208 New Post Office Building. From this office has been determined the availability of supplies of chinch bug materials, traffic routings, and tariffs to estimated destinations. This will also clear all information as to conditions of infestations and act as headquarters for procurement and delivery of creosote, of which 100 cars were being shipped by June 17. Early observations as to winter mortality of the bugs indicated a probable heavy outbreak unless subsequent weather conditions interfered. By mid-June indications pointed to serious subsequent damage to corn unless aggressive control operations were developed to protect this crop against migrations which were expected to occur in the immediate future. Infestations are indicated to be heaviest in Iowa, Kansas, Missouri, Nebraska, and Oklahoma.

Grasshopper development and control.--Grasshopper-control operations in the areas infested by the migratorial species were begun early in May in Texas, Oklahoma, and Colorado, and were increased rapidly toward the close of themonth as hatching progressed northward. Baiting was completed early in June in the area of the long-winged migratory species in New Mexico. By the latter part of May the hatch was general throughout many areas in the infested States, and control operations were carried on in some areas in all States except those of the northeastern part of the Great Plains, where the work was begun early in June. In that region low temperatures, rains, and wind in many areas retarded somewhat the hatch and development of the 'hoppers. The crops have developed rapidly, however, and it is believed that this situation, together with a slow sporadic hatch, may result in lessened damage. Much land formerly idle in the northern Great Plains is being cultivated this season, and the farm practices followed are better than heretofore from the standpoint of grasshopper control. In the crop 'hopper areas of the Middle West, the hatch was also retarded until the close of May, when it developed rapidly and farmers became very active in spreading bait. States and counties have participated in control activities. No extensive crop damage occurred in May.

Unusual baiting activities in two areas.--The most active grasshopper-control work early in June was in north-central Montana, where infestations of the lesser migratory 'hopper, principally in the first instar, appeared in greater populations than had been indicated by the fall survey. Farmers spread bait excitedly, and obtained excellent kills. Mixing stations have been operating 24 hours daily. Twenty carloads of bait material was mixed and distributed to farmers in a 6-day period. Bait materials far in excess of estimated needs have been furnished to Blaine, Choteau, Fergus, Hill, and Liberty Counties. Cooperation has been excellent and damage is not expected to exceed 10 percent, with a good chance for recovery of grain because of excellent moisture conditions. Nymphs are gradually spreading to pastures and ranges, next to the field margins and stubble. Heavy infestations of the same species are occurring in the Oklahoma and Texas Panhandles, in southeastern Colorado, and in two contiguous Kansas counties, where the 'hoppers are reported as concentrated on patches of Russian-thistle. The topography of this land, much of which is windblown sand, and the extent of the area make it impossible to use regular bait spreaders in most of the area. Baiting is being done by means of an autogiro and three planes.

Predators and dust in grasshopper areas.--Predators have been responsible in areas of several States for considerable reduction of grasshopper eggs and nymphs. Bee-fly and blister beetle larvae were recently reported as reducing grasshopper pods about 10 percent in four counties in southwestern North Dakota, and as much as 80 percent in two fields near Dickinson. Carabid beetles were reported numerous on egg beds of the long-winged migratory 'hopper, in the Panhandle counties of Texas. Birds, chiefly horned larks, in Las Animas County, Colo., were reported to have destroyed 50 percent of the 'hopper eggs in the more concentrated parts of the egg beds. Huge flocks of sea gulls were observed consuming large numbers of grasshopper nymphs in four Utah counties. In places in Wyoming wind-blown sand buried grasshopper field pods from 1 to 4 inches deep, and in Lincoln County, Colo., they were found under 2 inches of dust; however, a 75-percent hatch was expected in the latter area. Dehydration of egg pods in a few instances necessitated a marked reduction in ratings of the fall survey.

Mormon cricket development.--Mormon cricket hatching was completed at the lower elevations in most areas of the infested States the first week in May, whereas at the higher elevations some hatching was still taking place the latter part of the month. The first report of adult Mormon crickets was from Wasco County, Oreg., on May 1. Adult crickets also were reported in Washington the first week in May, in Nevada on May 13, in western Idaho on May 16, and in Utah, Montana, and Wyoming the week of May 19-25. May 13 is believed to be the earliest date recorded for adults in Nevada. Rapid migrations were occurring toward the close of the month and, although crop damage was held to a minimum during May, control crews in some areas were being hard pressed to divert crickets from crop lands, especially those immediately adjacent to heavily infested range areas. Mormon crickets in Wasco County were reported ovipositing in the week of May 19-25.

Mormon cricket control operations.--Control operations increased steadily during May, after a delay due to adverse weather conditions, and by the close of the month operations had reached the peak in a number of areas, while in others the thick cricket populations had been so reduced that control measures were no longer required. Power and hand-dusting, baiting, oil-on-water, and metal barrier, all have given excellent control and have been highly justifiable. States and counties have participated.

Various Federal agencies participate in the control of grasshoppers and crickets.--The substantial assistance given to the 1939 campaigns against the grasshoppers and Mormon crickets by various bureaus and divisions of the Departments of Agriculture and Interior, is again being made available for the present season. Arrangements have been completed with the Civilian Conservation Corps, the Indian Service, the Forest Service, National Park Service, Biological Survey, and the Division of Grazing of the Department of the Interior for assistance against these pests. Hand and power dusters, as well as trucks, are also being provided by some of these agencies. Last year's contributions by similar Federal agencies amounted to over $32,900 on the Mormon cricket work alone. The Federal Crop Insurance Corporation and Agricultural Adjustment Administration are encouraging farmers and counties to cooperate in control.

Peach-tree inspection.--The inspection of nursery and budwood properties and their 1-mile environs was completed in May in all States in which standard peach-mosaic quarantines are in operation, with the exception of Colorado. It was impossible to complete the nursery inspection in Mesa County, Colo.; however, most of the nurseries in that county are located in the heavily infected commercial area and grow stock for home use only. All nurseries in other States met the certification requirements of the standard quarantines. This is the first time in the history of the project that all nurseries in the regulated area in Texas have attained that standard. The disease was found within the environs of 13 such Texas nurseries in the current inspection, and all such diseased trees were removed prior to May 15, the time limit specified in the regulations. Reinspection will be made of all nursery stock in regulated areas next fall, prior to defoliation, as a further condition of certification. State and county participation in the phony peach or peach mosaic disease projects during May was represented by 48 field supervisory employees, and 1 office worker. These assistants were employed in Alabama, Arizona, California, Colorado, Missouri, Oklahoma, Tennessee, Texas, and Utah. Some 480 relief employees removed abandoned, escaped, and diseased peach trees during the month.

White-fringed beetle development.--Over a large part of the area infested with the white-fringed beetle the weather has been exceedingly dry, and this has resulted in most areas in retarding the development of the pests to the point where peak emergence of the adults is not expected prior to the last of June in the southernmost areas, and not earlier than the first of July in other areas. This is expected to result in an emergence period of not more than 2 weeks in practically all areas, a situation contrary to that of 1939 when, because of rainy weather, emergence extended over a period of 4 to 5 weeks. The situation has a decided bearing on control work and, unless there is a definite change in climatic conditions, the number of applications of insecticides needed to control the pests can be reduced.

White-fringed beetle inspection.--Intensive larval inspections carried on in May, throughout the infested areas resulted in locating a new infestation of the white-fringed beetle just outside the regulated area in Covington County, Ala. Intensive control operations and close inspection are being conducted on the infested property. Larvae were also found at points contiguous to formerly known infested area at Crestview, Fla., and on Blakely's Island in the Mobile, Ala., area, and dusting operations were promptly begun.

Spraying and dusting beginning in white-fringed beetle area.--Supplies of insecticides and ingredients used in the preparation of herbicide have been stored in each of the infested areas, ready for immediate use when the survey gave indications that the white-fringed beetles had reached the pupal stage and emergence might be expected. Direct control measures against the pests were begun in May in the various eradication areas. Host vegetation on waste and abandoned areas, on railroad yards, and in the vicinity of processing plants and other places from which there is danger of artificial spread, is being eliminated by the application of an oil-base, sodium-arsenite herbicide. Insecticides in the form of calcium arsenate or cryolite were applied during the month on infested localities of Alabama, Florida, Louisiana, and Mississippi. Repeated applications were made in many instances. Expressed in terms of one application, the area so dusted would total over 6,800 acres. At Bolton, Miss., power dusting was conducted over cottonfields. Discing has also gone forward in several areas, and the cleaning up of infested woodlands and other areas preparatory to dusting or spraying has been continued in Alabama, Mississippi, and Louisiana, with the assistance of W. P. A. labor.

Railway companies sign white-fringed beetle control agreements.--Agreements have been drawn up and signed by all 16 railway companies in the white-fringed beetle area, under which such companies have agreed to spray their tracks and premises in the infested areas, applying herbicide 1 to 5 times at the discretion of the Bureau, furnishing also engines and tank cars of specified capacity and the labor for their operation. The Bureau furnishes the spray ingredients and certain parts of the spray apparatus, and supervises the operations. Dealer-carrier permits have accordingly been issued to the above companies by the Bureau and the State concerned. Such dusting operations were in full progress during May.

Sweetpotato weevil control activities.--Within the eradication areas of the 4 States in which cooperative projects are conducted, but 4 sweetpotato weevil infestations were found in the trapping and inspection activities in May. Over 2,400 traps operated in Baldwin County, Ga., caught 5 adult weevils. Traps were placed in centers of infestations in Thomas County, Ga., without capturing any weevils. With nearly 300 traps in a Mississippi area, but 2 weevils were caught, and trapping on 30 farms in Nacogdoches and Cherokee Counties, Tex., gave negative results. Infested sweetpotatoes moving into Mississippi were intercepted by State inspectors. Pest-control officials of other States suppressed the movement of restricted materials coming into the control areas. State-sponsored W. P. A. laborers cleaned and destroyed host material on infested properties in Alabama and Mississippi. In Thomas County, Ga., wild host plants near formerly infested properties where normal sweetpotato plantings have not been resumed, were inspected, with negative results. Over 4,600 such plants of the Ipomoea genus, most of which were the huge-rooted I. pandurata, or "Indian potato," were dug by W. P. A. laborers, and inspected by the regular force.

Citrus canker found in Louisiana.--State inspectors found citrus canker on April 9 in Jefferson Parish, La., between New Orleans and the Gulf coast. Over 800 Citrus trifoliata from 3 to 5 years old were found so infected. Canker had been located some 10 years ago at a point 0.3 mile away, at which time all citrus trees on the property then infected were destroyed. The cankerous trees on the property recently found infected have been destroyed.

Uncertified plant shipments reported to States.--During inspection tours at Saint Paul in May, 100 plant shipments which were not certified in compliance with the Minnesota pest-control regulations were observed by the transit inspectors. Many of these shipments were important in that they were capable of carrying pests, such as the raspberry mosaic, the control of which has cost the State of Minnesota large sums of money.

Eighty of these State violations were found in the mails, 20 in express. The reporting to the States concerned, of uninspected plant shipments observed in the course of regular transit inspection is an established practice of transit inspectors. Such shipments of woody plants consigned by parcel post are also reported to the Post Office Department as infringements of the postal regulation which requires that such packages be accompanied by a State nursery-inspection certificate. Nearly 400 such shipments, observed at the various transit-inspection points, have been reported to that Department in the last 3 months.

Violations of Federal quarantines intercepted.--Over 500 apparent violations of Federal domestic plant quarantines were intercepted at transit-inspection points in May. Of these shipments, 4 were consignments of elms from the area under regulation because of the Dutch elm disease, addressed to points in Florida, Pennsylvania, South Carolina, and Virginia.

Wide shipping of plant material noted.--"The movement of nursery stock and plants has been broader this season than at any time in our memory," writes a seasoned inspector. "We cannot recall a year that saw such a wide distribution. Plants have been observed and inspected from every State in the Union and the Territory of Hawaii, as well as an air-express shipment of cut orchids from one foreign country."

CONTROL INVESTIGATIONS

Penetration of methyl bromide gas into soil.--H. H. Richardson and A. H. Casanges have found by insecticidal tests that methyl bromide gas penetrates well into either dry or damp greenhouse soil, but that very little penetration takes place into very wet soil. The results of one series are as follows:

Penetration of CH_3Br into dry, damp, and very wet soil in greenhouse, as indicated by insect mortality (insects buried in 9-inch pots of soil)

Insect	Mortality in soil		
	Dry	Damp	Very wet
	Percent	Percent	Percent
Flour beetle------------	100	100	3.9
Mexican mealybug---------	100	100	0
Chrysanthemum aphid-----	100	100	0

Other tests have given similar results. These results are also corroborated by chemical tests made in November 1939 on the methyl bromide concentrations found in experiments in a metal-lined fumigation chamber , analyses having been made by J. H. Dudley, of the National Institute of Health.

Dispersion of pyrethrum and rotenone.--The June issue of Soap contains an article on a new method of dispersing pyrethrum and rotenone in air. The authors of this paper are W. N. Sullivan, L. D. Goodhue, and J. H. Fales, of the Bureau of Entomology and Plant Quarantine. In summary, this publication states that an aerosol produced by spraying safrole solutions of rotenone and pyrethrum oleoresin alone and in combination, on a hotplate at 375° C., was tested against the housefly. The test flies were liberated in a 1,150-cubic foot room and subjected to exposure for 1 hour. In no test was a mortality of less than 74 percent obtained after 72 hours, and with a rotenone-pyrethrum mixture a kill of 95 percent was obtained. A mortality of 99 percent was obtained when adult Culex mosquitoes were exposed for 10 minutes to the aerosol produced in a similar way from an ethyl alcohol solution of pyrethrum. The possibility of use of this method for the control of tropical mosquitoes within airplanes is suggested.

INSECTICIDE INVESTIGATIONS

More new insecticides patented.--On May 14, 1940, there was issued to M. S. Schechter and H. L. Haller a patent (U. S. No. 2,200,564) covering the compound phthalonitrile as an insecticide. This substance is a colorless crystalline solid which melts at 141° C. It has the formula $C_6H_4(CN)_2$, is insoluble in water, and soluble in organic solvents. Experiments have shown it to be very toxic to the melon worm, the southern beet webworm, the Hawaiian beet webworm, the diamond-back cabbage worm, the southern armyworm, the Colorado potato beetle, the yellow bear, the celery leaf tier, the codling moth larva, and the screwworm. Preliminary tests indicate it is not injurious to foliage. Since phthalonitrile is the starting material for the preparation of a new line of stable blue pigments, it soon should be available in commercial quantities. On the same date, F. E. Dearborn was granted U. S. Patent No. 2,201,103, covering the use as both insecticide and fungicide of a homolog of paris green made from sulfurized fatty acids, rather than acetic acid.

Obaculactone identical with limonium.--In the work of the Division with the Amur cork tree, Messrs. Haller and Schechter encountered a material previously described by other workers and known as obaculactone. This substance, later identified by other workers as identical with evodin and dictamnolactone, as obtained from other plants, has now been identified in the Division of Insecticide Investigations as identical with the compound limonin as obtained from the pulp and seeds of the Valencia orange. It is suggested that the other names for this substance be dropped in favor of limonin, because it was the first one used. The Amur cork tree and the orange tree belong to the same family, namely, Rutaceae.

Fumigation with smoke from derris and pyrethrum.--In the October 1, 1939, issue of the News Letter (v. VI, No. 10, pp. 28-29) some preliminary results obtained by L. D. Goodhue and W. N. Sullivan against the housefly with the smoke from burning derris were reported. These authors have now published their findings in the April 1940 issue of the Journal of Economic Entomology (33(2):329), including the results of similar tests with pyrethrum. There is apparently little value in such a use of pyrethrum, but the results with derris were encouraging.

BEE CULTURE

Bacillus larvae spores not removed from sirup by bee's honey stomach.--A. W. Woodrow and E. C. Holst, Laramie, Wyo., report that sirup containing spores of Bacillus larvae White, recovered from the honey stomach of worker bees fed this material, was not found to be materially changed in spore content, as is the case of pollen content of ingested sirup or honey.

Causes of empty brood-nest cells.--Regarding his study on the causes of empty cells within the brood-nest, J. D. Hitchcock states: "The work of the summer of 1939 has indicated that the spotted character of brood in certain healthy colonies is apparently due both to irregular laying, which seems to be characteristic of certain queens, and to a heavy brood mortality, occurring in all stages of development but principally before the fifth day from the time of egg laying. Brood mortality is influenced by many factors, including colony population, availability of nurse bees, total amount of brood in the colony, pollen reserves, and many uncontrollable factors, such as seasonal changes. Exposure of the brood during counting and photographing operations was apparently not responsible for serious mortality in these tests. Great variations in brood mortality occurred in colonies headed by queens of the same strain and even in individual colonies, so that it is impossible from the results of these tests to state that a high or a low mortality is characteristic of a given strain."

Multiple matings improve egg-laying performance of queen.--W. C. Roberts, Baton Rouge, La., gives the following data obtained from a study on the natural matings of queen bees: "Of 25 naturally mated queens (16 double-mated and 9 single-mated) introduced into normal colonies in August 1939, 8 queens were being or had been superseded in March 1940. Of the 16 double-mated queens, 2 had been superseded and 1 was superseding, and of the 9 single-mated queens, 4 had been superseded and 1 was superseding. The colonies headed by supersedure queens were outstanding in quantity of brood and bees, and colonies headed by double-mated queens were better than those having single-mated queens."

Factors governing queen rearing in swarm box.--E. Oertel, Baton Rouge, draws the following conclusions based on results obtained in 1939 relative to queen-cell and royal-jelly production: "It appears there is no relationship between total weight of larvae and total weight of royal jelly per swarm box, or between weight of larvae and pounds of bees per box. There is a slight positive relationship between percentage of cell acceptance and pounds of bees per box, between weight of royal jelly and pounds of bees, between total weight of larvae and percentage of cells accepted, and between total weight of royal jelly and percentage of cells accepted."

Tribute to C. S. Bisson.--Frank E. Todd, Davis, Calif., pays the following tribute to the late Dr. Charles S. Bisson, of the College of Agriculture, University of California, Davis, Calif., who rendered such valuable cooperative assistance to the Division in studies of wax: "The loss of Dr. Bisson is a serious blow to the chemical work planned for this laboratory. The enlightenment resulting from his work on beeswax and pollen indicates a crying need for chemical work in the bee field. The final report of Dr. Bisson's work on fractioning of beeswax by use of temperatures and solvents indicates the widely different physical and chemical character of the various fractions. Although far from complete, this work suggests that beeswax properties may be altered by removing various fractions, which would widen its possible commercial uses and markets. The studies of pollen pigments, started by Dr. Bisson, showed them to be of both water- and fat-soluble types. It has already been shown that the fat-soluble pigments give the yellow colors to beeswax, but this quarter's work indicates that honey colors may be produced by the water-soluble pigments. Fresh nectars are invariably white, but honeys range in color from water-white to amber, even though from the same plant species, when produced in different localities. By contact with certain pollens, sirups have taken on characteristic honey colors. Honey color is a vital economic factor, as prices are based largely on color grades."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Another mosquito new to United States.--In The News Letter dated April 1, 1940 (v. VII, No. 4, p. 28) was reported the collection and rearing of Deinocerites spanius Dyar and Knab at Brownsville, Tex., by Frank W. Fisk, Jr., of the Aedes aegypti Control Unit, of the Public Health Service. The same collector has recently submitted a single male of Culex chidesteri Dyar, trapped at Brownsville on December 4, 1939. This species was described from Colon, Panama, and has also been taken in Venezuela and Brazil. The species breeds in ground pools. As it has not been found between Panama and Brownsville, it is possible that it has been introduced by airplane.

Receipt of rare ant.--About a dozen specimens of Cerapachys augustae Whlr. were received for determination from the Wild Life and Fish Service. These specimens were taken from the stomach of an armadillo at Huntsville, Tex. M. R. Smith states that, except for the types of this very rare and primitive ant, this is the second lot of specimens ever to have been taken.

Singing Orthoptera treated as pets.--On May 15, 1940, A. B. Gurney received for identification a male of the cricket Gryllus campestris L., in a small cage of wood and wire taken from personal baggage aboard the American Clipper plane at New York. The cricket had originated in Portugal, but had been obtained by the passenger at a party in London. Many of these crickets were said to be for sale in Lisbon. This species is one of those about which Fabre wrote. There have also been received for identification two male specimens of the katydid Mecapoda elongata (L.) in a small wooden cage, intercepted at Honolulu from Japan on September 22, 1938. This is a common species in the Orient. At San Francisco and other ports on the Pacific coast, crickets of various species are often found as pets in the crews' quarters of ships from the Orient. The keeping of crickets for fighting and singing has been especially well developed in China. In 1927 Berthold Laufer, curator of anthropology at the Field Museum of Natural History, Chicago, prepared a detailed and well-illustrated booklet on "Insect-musicians and cricket champions of China." The Japanese keep crickets for singing, but not for fighting.

A new food plant for the chinch bug.--H. S. McConnell, of the University of Maryland, has recently submitted for identification some chinch bugs determined by H. G. Barber as Blissus leucopterus (Say), collected on the common southern cane (Arundinaria sp., probably tecta) at Anderson, S. C., on March 1, 1940. These were found in considerable number under the basal sheaths of the leaves and presumably were feeding there.

An apparently new rice pest in Colombia.--The Secretary of Agriculture, Ibague, Colombia, has transmitted for identification through J. L. Colom, chief of the Division of Agricultural Coöperation, Pan American Union, a number of specimens of a cydnid (one of the negro bugs) reported as causing damage to ricefields in the Department of Tolima, Colombia. It was stated that these also fed on two weeds, *Triumfetta* sp. and *Cassia occidentalis*. These specimens were determined by H. G. Barber as *Alkindus atratus* Distant, a widely distributed species recorded from Mexico, Central America, Colombia, Venezuela, and the Republic of Santo Domingo. C. H. Ballou has collected it on *Cenchrus viridis* in Costa Rica.

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VOLUME VII

UNITED STATES DEPARTMENT OF AGRICULTURE

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NEWS LETTER

FOR JUNE 1940

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ADMINISTRATION

New Plant Quarantine Building, Hoboken, N. J.

The plant quarantine building at Hoboken, N. J., which had been under construction since the fall of 1938, was taken over on June 27 and occupied on June 28. The building houses the special-permit inspection and treatment work of the Division of Foreign Plant Quarantines, with George G. Becker in charge, and the insect-parasite work of the Division of Foreign Parasite Introduction, with T. R. Gardner in charge. It occupies the site of the old Captain Mueller house on the east side of River Street between piers 2 and 3 of the old North German Lloyd Steamship Company, which was taken over by the United States during the World War. The site of the building was allocated to the Department of Agriculture by the U. S. Maritime Commission, largely through the efforts of Bernard Connor of this Bureau. The Bureau's part in the preparation of the plans and specifications for the building, the supervision of construction, and the numerous details associated with its erection and construction have been handled by Lon A. Hawkins, leader of the Division of Control Investigations.

The building is constructed of reinforced concrete with tile walls and buff brick on the outside. It is trimmed with four bands of brown glazed terra cotta with ivory terra cotta coping. Window sash are steel, doors are metal clad, floors are cement with lineoleum finish or quarry tile, and the building is practically fire-proof. It is 144 by 52½ feet and has four stories, with basement, boiler room, and penthouse. Three 50-horse power high-pressure oil-burning steam boilers are installed in the basement, the floor of which is approximately 5 feet below low tide. The oil tank has a capacity of approximately 10,000 gallons of fuel oil and is located beneath the first floor at the south end of the building.

The first floor comprises shipping and receiving rooms and has approximately 3,200 square feet of floor space for the handling of shipments. In addition two cold-storage rooms with approximately 550 square feet of floor space are provided on this floor, together with a vacuum fumigation tube of 1,000 cubic-feet capacity, a two-car garage, a transformer room, an electrical room, a machine room containing two 20-ton and one 10-ton Freon compressors and two large two-stage vacuum pumps with accessories. The lobby on the first floor is finished in buff terra cotta and marble, with aluminum trim and aluminum and monel metal doors.

The second floor is given over to inspection and treating rooms, there being one inspection room 107 by 18 feet, and another 30 by 32 feet. A fumigation room 30 by 32 feet contains five steam-jacketed vacuum-fumigation tubes and four atmospheric-fumigation chambers. A heat-treating room is equipped with four hot-water treating tanks, two large autoclaves for high-pressure steam sterilization, a large steam drier, and two large chambers for treatment with moist heat or for drying. The finish of the rooms on this floor is ivory terra cotta walls with buff quarry tile floors. The large inspection room is air conditioned.

The third floor contains offices and laboratories and comprises 13 rooms fitted up either for office or laboratory work. A dark room and photographic laboratory are included.

The fourth floor is equipped for insect-parasite work and consists of 4 office rooms and a work shop, which are not air conditioned, 12 insectaries, a corridor, and 2 parasite-handling rooms, which are air conditioned, with a separate installation for accurate regulation of the temperature and humidity of each room. The air-conditioned rooms are provided with tight triple-glazed windows. Four cold-storage rooms are also provided in this section.

FRUIT INSECT INVESTIGATIONS

Ten years of trapping for dried-fruit beetle.--Records for 10 years' trapping of Carpophilus hemipterus (L.), to study the conditions which influence the size of the overwintering and spring populations, have been completed this spring by D. F. Barnes, of the Fresno, Calif., laboratory. The trapping consisted of operating 3 traps, baited with fermenting dried cull peaches and yeast, in each of 4 locations during the 10-year period. All locations were within a 15-mile radius of Fresno. With the exception of 1933, a late season, traps were placed in the field late in February. Beginning with the first week in March, collections and examinations of the catches were made at weekly intervals for a 12-week period. This spring, after a dry November and December and a warm, wet January and February, 8,804 dried-fruit beetles were taken in 994 trap-days, or 8.9 per trap per day. During the 10 years of spring trapping, 112,187 individuals have been recorded in 9,789 trap-days, or 11.5 per trap per day. Observations in previous years have indicated that moisture in the soil when the larvae are entering it for hibernation assists them in establishing themselves. On the other hand, adults, which do not hibernate but merely cease activity during cold spells, are assisted in overwintering by warm, dry weather. Apparently dry weather and soil in the late fall, followed by wet conditions in midwinter, reduced the 1940 population. The following table summarizes the observations of the 10-year period.

Collection dates	Dried fruit beetles taken per trap per day in--									
	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940
	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
March:										
2-4	0.8	0.3	--	23.0	0	14.3	0.7	--	3.6	2.4
9-11	1.2	.7	--	18.6	0.01	11.8	.7	0.2	3.3	8.2
16-18	1.2	.9	---	13.9	.5	9.3	.6	.3	10.2	7.4
23-25	2.1	.8	--	11.3	.5	7.7	.5	1.3	10.0	7.6
March 28-April 1	2.9	.8	0.4	10.7	.9	6.6	.5	--	8.7	6.3
April:										
4-8	4.5	.9	1.0	15.9	1.2	6.4	.5	2.8	8.7	6.7
11-15	4.3	1.1	.9	21.4	1.5	8.2	.9	2.8	10.5	7.6
18-22	6.3	1.1	1.2	24.1	1.6	8.5	1.1	3.5	11.0	7.6
25-29	6.7	1.1	2.1	23.9	1.6	8.7	1.1	3.8	10.8	7.1
May:										
2-6	10.0	1.2	2.4	25.3	1.8	10.3	1.2	2.7	10.8	8.0
9-13	12.9	1.7	4.6	30.3	2.1	13.4	1.4	3.4	10.9	8.8
16-20	20.3	1.8	9.1	31.4	2.5	17.0	1.5	4.8	11.4	8.9
23	--	--	13.0	--	--	--	--	--	--	--
30	--	--	18.5	--	--	--	--	--	--	--

Survey on blueberry mite.--For several years complaints have been received of serious injury to cultivated blueberries in North Carolina by a species of mite. At first the identity of the mite was not known, but it was described in 1939 by H. H. Keifer, of the California Department of Agriculture, as *Eriophyes vaccinii* (see Calif. Dept. Agr. Bul., v. XXVIII, No. 5, p. 229. 1939). By courtesy of the California State Department of Agriculture, Mr. Keifer has recently spent several weeks in a survey of a number of Eastern areas, in order to determine the status of this mite. Although the mite was first known to occur only in North Carolina, Mr. Keifer found it in cultivated plantings in New Jersey and Georgia, and in wild blueberries at many points from southwestern Connecticut to the vicinity of Gulfport, Miss. Most of the surveys were made along the coastal plain, although one trip into the Blue Ridge Mountains revealed the presence of this mite near Sperryville, Va. The North Carolina Experiment Station is now carrying on investigations to develop methods of controlling this pest.

More on dichloroethyl ether for control of plum curculio.--Oliver I. Snapp reports that the results of laboratory experiments just completed at the peach-insect laboratory at Fort Valley, Ga., show that, even when applied to very damp soils, dichloroethyl ether at the rate of 1 fluid ounce in 1 gallon, using 1/6 gallon or 7 fluid ounces of water per square yard of soil, is very effective against plum curculio pupae. Not a single individual reached the adult stage where the most dilute spray was used against 750 plum curculio pupae. Only 1.2 and 1.1 percent, respectively, reached the adult stage where the 2 most concentrated sprays were used in each experiment against 750 plum curculio pupae. One-third fluid ounce of dichloroethyl ether in 1/6 gallon of water per square yard of soil was not so effective against plum curculio larvae as 1/3 fluid ounce in 1 gallon of water when tested on thoroughly wet soil. The adult emergence from 750 larvae in each of these experiments was 12.5 and 2.5 percent, respectively. From the soil under 4 caged peach trees, each artificially infested with 350 plum curculio larvae in addition to those naturally present, only 1 plum curculio adult emerged following 1 treatment with dichloroethyl ether at the rate of 1 fluid ounce in 1/6 gallon of water (1/6 gallon of 4.5 percent emulsion of dichloroethyl ether) per square yard of soil. This individual was weak, and died 4 days after emergence.

MEXICAN FRUITFLY CONTROL

Fruitfly damage below normal.--The number of fruitflies trapped in Texas in June exceeded expectations somewhat. Fruitflies totaling 1,126 were submitted for identification from all parts of the regulated area early in the month, but there was a drastic reduction in the number of adults taken in the latter half of June. Only a very few of the female flies trapped were gravid and almost all flies appeared to be newly emerged. Reports from all the districts indicate that the new citrus crop is developing satisfactorily and that less than the normal amount of insect damage is present. Estimates on next season's fruit production foreshadow a noticeable reduction in the grapefruit production for the coming season.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Numbers of grasshopper egg pods required to produce outbreaks differ for various types of habitat.--C. C. Wilson, Sacramento, Calif., reports that an egg survey conducted in foothill grazing land in the lower San Joaquin Valley in 1939 averaged 0.3 egg pod per square foot, which was sufficient to produce an outbreak of grasshoppers in Kern County, with attendant migration into cultivated crops, in 1940; whereas in the coastal habitat of the economic species of grasshoppers, in San Luis Obispo County, an average of 1.3 egg pods per square foot was recorded in 1939, with no appreciable migration or noticeable damage to the range forage in 1940. The marked difference in the numbers of egg pods required to produce an outbreak in the above-mentioned areas is thought to be due to the size of the egg beds and the availability of food. In the lower San Joaquin Valley the egg beds were probably more widespread and the density of vegetation averaged about 60 percent, whereas in San Luis Obispo County the egg beds were restricted to relatively small areas and the density of vegetation approached 100 percent.

Modification of resistance by environmental factors in hessian fly control.--W. B. Cartwright, Lafayette, Ind., says that extreme caution must be observed in interpreting field and greenhouse tests on wheats resistant to the hessian fly, owing to the modification of resistance by environmental factors. Illinois No. 1 W38, a vulgare resistant wheat, approaches a plant infestation of susceptible varieties when grown in the greenhouse with high temperatures, together with adverse light and other unnatural factors. Such modification, however, has not been expressed in the Durum F.P.I. 94587, or in some of its winter hybrids.

Effect of boron on alfalfa attacked by potato leaf hopper.--F. W. Poos, Arlington Farm, Va., reports that experiments on the effect on the potato leafhopper of varying amounts of boron in the nutrient solutions supplied to vegetatively produced alfalfa plants showed no significant differences in the number of nymphs produced on the various lots. Plants receiving no boron showed diseaselike boron-deficiency symptoms and such symptoms seemed to be aggravated by the presence of potato leafhoppers on such plants. Typical symptoms of potato leafhopper injury occurred coincidenta on such plants. Field observations on small plots in south-central Virginia indicate that 10 pounds of borax per acre, applied in fall or spring, prevents much yellowing of alfalfa not caused by the potato leafhopper.

Effectiveness of poison bait for grasshoppers.--O. L. Barnes, of the Tempe, Ariz., laboratory, in discussing his observations on the intensive study area for grasshoppers, at Yuma, Ariz., during the spring of 1940, says: "Standard poisoned-bran bait was applied to the entire acreage in the area between April 1 and May 13. In some fields with the heavier infestations two, and sometimes three, general applications were made. A mechanical spreader of the type recommended by the grasshopper control unit of the Bureau was used, and the entire surface area of fields was covered. Results of poisoning were good, as evidenced by reduction in populations of living hoppers and the presence of dead hoppers after bait applications. The effectiveness of the baiting operations may be examined in the light of comparative egg, nymphal, and adult populations in alfalfa fields during the winter of 1939-40 and the spring of 1940. This could call for a No. 4.2, or 'severe' infestation rating. A survey on March 27-28 at 6 representative alfalfa locations showed an average nymphal population of 59.3 hoppers per square yard. Such a nymphal population requires an infestation rating of 4.5, or 'severe.' The actual spring-peak population had not been reached by March 28, but owing to poisoning and pasturing at some locations, the population crest had been passed before the next observation visit on April 9-10. The actual peak, had the hoppers been unmolested, would have justified a No. 5, 'very severe' infestation rating. A fence-row and field-margin egg population of 3.82 pods per square foot the winter before was ample to raise the general infestation rating in the vicinity of alfalfa fields to No. 5, 'very severe.' These No. 5 winter egg and spring nymphal ratings were followed by a spring adult rating of No. 1, based on an average population of 2 hoppers per square yard May 22, when most of the living hoppers had reached the adult stage. This reduction in the grasshopper status from a 'very severe' to a 'normal' rating was due in the greater part, it is believed, to thorough and timely applications of poisoned bait while most of the hoppers were in the nymphal stage."

Substitute for Chinese-gallotannin in dust preparations of dual-fixed nicotine.--C. H. Batchelder, New Haven, Conn., in discussing the results of field experiments with insecticidal preparations in dust form for control of the European corn borer in 1939, reports as follows relative to substitutes for Chinese gallotannin: "The results of the tests with experimental preparations of nicotine indicated: (1) Either the quebracho or myrobalans types of dual-fixed nicotine may be used without injury to sweet corn. (2) Myrobalans tannin, as prepared and used under the conditions of this experiment, was a satisfactory substitute for Chinese gallotannin in dual-fixed nicotine, displaying in this experiment very good promise of being equally useful under various weather conditions. (3) Quebracho of the low nontannin type was a satisfactory substitute for Chinese gallotannin in dual-fixed nicotine, as used in this experiment during a period of drought. Its performance gave some indication that the adhesiveness of this material should be increased if it is to be used where moderate rainfall is a frequent occurrence."

Synthetic media for rearing European corn borer larvae.--In general, the results of recent investigations being conducted by G. T. Bottger, Toledo, Ohio, relating to the development of synthetic media for rearing corn borer larvae, indicate the most satisfactory were those formulated in approximately the following percentages: Inert carrier (cellulose 3.6, agar 1.8), 5.4; protein (casein) 3.6; reducing sugar, 2.4; invert sugar, 1.3; mineral salts, 0.6; fat, 1.3; water, 85.4. As many as 36 percent of larvae nourished entirely on a purely synthetic food survived to larval maturity and attained normal or near normal weights during a 30- to 40-day test period and, of those that survived, from 20 to 30 percent pupated in some of the groups. With further research directed toward the amino-acid relationship to corn borer nutrition, it is probable that both the growth rate and size of synthetically nourished larvae and resultant moths can be controlled at will.

Occurrence of multiple-generation European corn borers in the Lake States.--A. M. Vance, Toledo, reports that progeny rearings of European corn borer in the laboratory from field-collected parent stock in the Lake States area, indicate that, at the present time, the second-generation tendency is very pronounced in the southeastern part of the infested part of Indiana, in Wayne and Union Counties, less important in the more northern counties of Allen, Ind., and Allen, Ohio, and negligible in the Michigan counties of Calhoun, Washtenaw, and Tuscola. A little evidence of the second-generation character was found in Ashtabula County, in the extreme northeastern corner of Ohio.

Clean-up for European corn borer control near Boston, Mass.--E. W. Beck, Waltham, Mass., states that the spring debris survey in the Waltham study area indicates an improvement in clean-up and destruction of overwintering borers in that locality, as shown by reductions in host-plant material and borers from 1938 to 1939 of 91 and 95 percent, respectively, as compared with similar reductions from 1939 to 1940 of 97 and 99 percent, respectively. This may be a reflection of the heavy losses suffered by the growers in 1939, resulting in greater emphasis on clean-up measures.

European corn borer parasites in Eastern States at end of 1939.--C. A. Clark, Moorestown, N. J., reports that investigations of the field status of parasites of the European corn borer were conducted at seven locations in the Eastern States area at the close of 1939, the results from six of these survey districts being summarized as follows: Inareolata punctoria Roman, an introduced ichneumonid parasite of corn borer larvae, averaged 10.6-percent parasitization of the borer, with a maximum of 23.9 percent in the Middlesex, Mass., district. At the Hartford, Conn., district, this parasite averaged 8.7-percent parasitization of the borer in the 133 square miles surveyed, with an average of 14.1 percent in the central 7.1 square miles nearest the point of longest establishment. The maximum recorded parasitization by this parasite in the Hartford district was 34.8 percent. No conclusions could be reached as to directional dispersion, but that dispersion of the parasite had passed beyond the extended limits of the surveyed area was evident from the data obtained. I. punctoria was found to be well established at the more recent liberation point at Atlantic, N. J., where parasitization by it had reached 2.2 percent. It was not recovered from a small collection of host larvae made at Brick, in Ocean County, N. J., but was recovered, showing initial establishment and maintenance, at Burlington, N. J., where it was released in 1938. This parasite was not recovered on the Eastern Shore of Virginia. Lydella grisescens R. D., an introduced tachinid parasite of corn borer larvae, was recovered in somewhat larger numbers than in 1938 from the collections made in Middlesex County, Mass., but was still comparatively scarce there. This dipterous parasite was recovered in nine townships within the Hartford, Conn., district. A parasitization of 18.9 percent was recorded for one collection from this district. L. grisescens has continued to disperse, particularly in a westward and northwesterly direction, and may be found over 6 miles from the point of release in the center of the Hartford district. This tachinid was found to be well established at Atlantic, Monmouth County, and Brick, Ocean County, N. J. At Burlington, N. J., it was found to be well established and spreading rapidly from the point where a small number of adults were first released in 1939. In Virginia L. grisescens had not increased in 1939 but continued to be the only exotic parasite of the borer at work there. The average parasitization of the corn borer by this parasite was 7.2 percent at Lee and 1.4 percent at Franktown, both on the Eastern Shore. Chelonus annulipes Wesm., an imported egg-larval parasite of the borer, was found to be widely established in the Hartford, Conn., district following releases in the spring of 1939. Apparently widespread initial establishment was obtained here by proper synchronization of adult parasite releases with host-egg abundance. This braconid parasite of the borer was also recovered at the point of recent release in the Burlington district of New Jersey. It was not recovered in Virginia, where it was initially established in 1937. The native parasites Bassus agilis Cress. and Labrorychus prismaticus Nort. were again recovered, the former at the Middlesex, Mass., and Hartford, Conn., districts, and the latter species at Middlesex only. Neither species showed any indication of increasing parasitization of the borer and both remain unimportant as parasites of the overwintering generation.

Domestic collection of European corn borer parasites.--Mr. Clark also states that the supply of the polyembryonic parasite Macrocentrus gifuensis Ashm. for colonization in 1940 was obtained from host larvae collected in the fall of 1939 in southeastern Massachusetts and reared out at the Moorestown, N. J., corn borer laboratory last spring. A total of 20,068 larvae, each isolated in an individual shell vial, were removed from cold storage on May 22 and placed under developmental conditions of 75° F. and 80 percent relative humidity. When the M. gifuensis larvae issued from the hosts and formed cocoons these were removed from the incubator to a parasite-emergence chamber in an outside insectary. No less than 4,215, or 21 percent, of the host larvae placed in the incubator gave M. gifuensis. From these 4,215 cocoon masses, supplemented with an additional 120 masses from parasite field-status collections, 78,815 M. gifuensis adults were reared, or an average of 18.2 adults per cocoon cluster. About 2,000 Chelonus annulipes, 1,600 Lydella grisescens, and 500 Inareolata punctoria were also reared from these borers.

European corn borer parasites in Lake States at end of 1939.--W. G. Bradley, Toledo, Ohio, reports as follows on surveys conducted during October 1939 to determine the status of exotic and native parasites of the European corn borer in selected districts in the Lake States area infested by the European corn borer: "Three species of exotic parasites were reared from 161 sample collections comprising 14,112 larvae. This material was held in cold storage during the winter and reared in a developmental environment in March and April 1940. One of the species, an ectophagous chalcid, Eulophus viridulus Thoms., which had been recovered for the first time in 1938 following its release in 1931 and 1932, was taken at a number of new localities including points where observations had been made annually since the year of release. It is evident that this parasite became established and remained on a maintenance basis for a number of years in concentrations too low to permit recovery by the means utilized. That the slow increase in the abundance of the parasite has been accompanied by considerable dispersion is evidenced by its recovery at a point 19 miles from the nearest release point. Lydella stabulans var. grisescens R. D. was the most abundant parasite recovered but, contrary to results in previous years, no increase in parasitization was noted at any point. At 2 of the oldest release points where parasite populations had shown yearly increases to a comparatively high level, the parasitization remained the same in 1939 as in 1938. It is probable that equilibrium of the parasite with its host was attained in 1938 in the immediate vicinity of the release points. In areas adjacent to marshland L. grisescens continued at a high level, the borers in many of the collections showing a parasitization of over 50 percent. Chelonus annulipes Wesm., an egg-larval parasite, showed a considerable increase in abundance at a point near Toledo, Ohio, where it had been released in 1938 to test its reactions in a locality where the proportion of multiple-generation hosts was comparatively high. The parasitization in one collection was 12.6 percent. Three native parasites, Zenillia caesar Ald., Panzeria penitalis Coq., and Labrorychus prismaticus Nort., were obtained in small numbers in the fall survey."

Laboratory breeding of Chelonus annulipes.--W. G. Bradley, Toledo, Ohio, summarizes as follows the current laboratory breeding program for Chelonus annulipes Wesm., to provide adults for colonization of this European corn borer parasite, principally in the Hudson River Valley, and utilizing Ephestia kuehniella Zell. for the host breeding stock: "From the E. kuehniella eggs, parasitized principally in March by an average of 14 females per day ovipositing for 18 days, there emerged in March and April, 5,783 adults. Females of this generation were used to parasitize host eggs for the production of material to be released chiefly during the period June 3-10 in the Hudson River Valley, N. Y. Oviposition started on April 10 and by May 1, there had been exposed for parasitization 7,590 egg clusters (eggs stuck to cardboard 100 per cluster). This was an average of 345 per day. The maximum number utilized on any 1 day was 711. Emergence of adults from this material started on May 17 and by June 18 over 125,000 adults had been produced. At the time the parasitized material was discarded the adults were still emerging at the rate of 3,000 per day; therefore it is probable that over 150,000 adults would have been obtained."

JAPANESE BEETLE CONTROL

Local Japanese beetle campaigns.--J. L. Prouty, of the Springfield, Mass., park department reported on June 30 that 200 Japanese beetle traps had been set by his department. A total of 1,600 traps will be placed in Springfield by Mr. Prouty's organization. John A. Pierson, superintendent of the Union County, N. J., Park Commission, announced that he had obtained 250 beetle traps for distribution throughout the county's park system. Beetle traps were leased by the City Forester of Baltimore, Md., for 15 cents each for 2 years, and were supplied at any of the city parks. The first 1,000 individuals leasing traps were given a bonus of a small package containing spore dust of the milky disease attacking Japanese beetle grubs. Directions were provided for spreading this dust on lawns.

Airplane inspection.--Inspection of planes to prevent spread of the Japanese beetle by aircraft was inaugurated at the Washington, D. C., Airport on June 26. Ten minutes before the departure of each passenger ship destined to a point outside the regulated area, a thorough inspection is made of the pilot's cockpit, forward baggage compartment, passengers' cabin, and rear baggage compartment. After this inspection, and when no loading of passengers or freight is taking place, all doors and openings are kept closed to prevent beetles from flying in. All baggage and mail bags are watched as they are put on each ship, and any beetles found on them are removed. Passengers entering the plane just prior to departure are watched closely for beetles which may be clinging to their garments. In the course of this inspection, 38 beetles were removed from June 26 to 30. Most of these were on mail bags and passengers or in the cockpits of the various planes.

Refrigerator-car inspection and certification for Japanese beetle.--Fumigation of empty refrigerator cars with HCN and loaded cars with methyl bromide began in June. Operations started at the Edge Moor, Del., yards on June 13, at Baltimore on June 21, Philadelphia on June 22, and Trenton on June 27. Owing to delayed emergence of adults in the New York City area it was possible there to forego fumigation until after June 30. Fumigation procedures this year remain the same, with the exception of the HCN fumigation of empties by the United Fruit Company. This year the "splash method" was approved. This permits the 3 ounces of liquid HCN to be measured and splashed through the bunker door against each end of the car. This eliminates the necessity for pans in the bunkers, thus saving much time and inconvenience. The fumigation of loaded cars was unchanged. As the railroad still had a large supply of cylinders on hand they continued to use the 15-pound applicators. Fifty-four carloads of cabbage were fumigated with methyl bromide at Cape Charles, Va. Ordinarily the cabbage crop in that area is harvested and shipped before the farm products quarantine becomes effective.

Early Japanese beetle emergence.--The earliest reports of emergence of adults came from the Norfolk, Va., field office, where 8 beetles were trapped on June 5. Subsequently beetles were observed in Cape Charles, Va., on June 8; Lancaster, Pa., on June 12; and Sewell, N. J., on June 17. Beetles did not appear at Bloomfield, N. J., until June 30. Beetles appeared to be numerous over the entire Norfolk area. First-record finds were reported in June on several classified establishments. Toward the end of June heavy infestations were noted in the Baltimore area. No beetles had been observed by June 30 along the Delaware River and in nearby public squares in Philadelphia.

Packing houses screened against beetles.--Several packing houses on the "DelMarVa" Peninsula started screening early in June and it appeared that there would be practically 100-percent screening of packing houses in that area. Beetle-proofing of the packing houses will eliminate all possibility of reinfestation after the products have been inspected. Farm scouts operating from the Dover, Del., and Salisbury, Md., offices had a much larger group of farms to scout this season. Products from uninfested farms are not subject to the same inspection at the packing houses that is given products from farms on which beetles have been found.

Long Island estates treat plantings prior to removal.--One Long Island estate applied lead arsenate to soil around 400 trees and shrubs, including considerable boxwood. These plants are to be trucked to a point outside the regulated area in Virginia. Another estate at Southampton treated with lead arsenate a hundred or more large, old potted hydrangeas, bays, fig trees, and oleanders. These have a high sentimental value. Operations involved in their crating and transportation to a point outside the regulated area will cost about $1,000.

Japanese beetle scouting.--Scouting crews were started in June in the southern part of the regulated area. On June 17 two crews started activities in the Richmond, Va., area, and one crew began work in the Alexandria and Fredericksburg, Va., section. Eleven temporary inspectors were added to the force on the Eastern Shores of Maryland and Virginia to take care of the nursery and greenhouse scouting work.

Modification of methyl bromide fumigation requirements.--Another modification of the methyl bromide fumigation instructions, effective June 4, reduced the dosage of fumigant required per refrigerator car from 5 to 4 pounds when the temperature is 80° F. This will reduce the cost of fumigation and eliminate some of the hazards in the fumigation of certain fruits and vegetables. The treatment at the reduced dosage is approved for white potatoes, sweetpotatoes, onions, tomatoes, snap beans, lima beans, sweet corn, cabbage, carrots, beets, apples, and peaches. The reduced dosage at the higher temperature is also authorized for the fumigation of these commodities in approved fumigation chambers.

Preliminary seasonal activities in New York City area.--Of 266 miscellaneous calls made by the New York City inspection force during the month, most of them were for the purpose of acquainting shippers, brokers, and produce dealers with the Japanese beetle certification requirements for fruits and vegetables moving to nonregulated area via refrigerator car or motortruck. This is the first season that New York City and vicinity have been included in the heavily infested area.

Summer scouting for Dutch elm disease started.--Systematic scouting activities started on June 17 in all counties in the New Jersey work area, except in the southernmost counties of Burlington and Ocean. All qualified men, except a minimum number of foremen and climbers needed to keep W. P. A. laborers going on elm-sanitation work, were assigned to scouting. Some 300 men, approximately half of the New Jersey field force, were thus transferred. Scouting in June involved systematic foot scouting of approximately 1,800 square miles, or a 50-percent representative sample of the work area. Advance survey scouting was performed in the remainder of the work area and over 2,000 square miles were covered the last week in June. No extensive wilting was in evidence anywhere in New Jersey. Similar scouting activities started on the same date in the New York area above the New York City line, 468 W. P. A. scouts being assigned to the State. All scouting for bark-beetle infestation or for elms subject to beetle attack was discontinued in favor of summer foliage scouting. A few crews in each county were kept to clean up all burning of accumulated wood piles and the removal of confirmations. Whenever possible, bark-beetle infested trees will be tagged during the regular scouting program. Scouts in New York reported at the end of June that a large number of elms showed sparse foliage. Close examination showed that the leaves were small and many of them just breaking through. This is believed to be due to extreme lack of moisture in 1939. Many of these trees, if attacked by elm bark beetles this summer, might not survive another year. County supervisors in New York reported on June 29 that few wilted trees had been found in the work area of that State, the first time that such a situation had been reported at the end of June since the beginning of the Dutch elm disease eradication work in 1933. The earliest typical wilt in New York was found in the town of Oyster Bay, on Long Island. Two trees within 10 feet of one another were involved. Additional trees were found wilting on a property where 14 trees were confirmed in 1939. In Nassau County, 6 specimens were collected, all within 25 feet of 1939 confirmations. All 6 trees seemed to be infected from root grafts, as suckers near the base of the trees showed the first wilt.

Foliage symptoms delayed.--Rain and cool weather delayed the appearance of foliage symptoms of Dutch elm disease infection and hampered the start of summer scouting. Scouting was postponed in Connecticut but it was necessary to assign all available men to scouting on June 20 in order to complete the area scheduled for completion by the end of the month. A considerable number of trees that apparently showed wilting symptoms were observed prior to June 20 but were found to contain only storm-damaged branches. Late in the month only isolated cases of wilting were reported in Connecticut. Very few samples of discolored twigs suspected of harboring the Dutch elm disease fungus were collected in that State. In New Jersey wilting was reported early in June in a block of 100 slippery elms growing on a cliff in Kingwood Township, Hunterdon County. Most of these elms showed severe die-back, apparently due to last summer's drought. Eight or ten of them showed heavy wilt and discoloration apparently typical of Dutch elm disease infection.

Trap wood piles destroyed.--In mid-June destruction was started of 375 piles of elm logs placed early this spring throughout the New Jersey Dutch elm disease work area. Observations of these wood piles disclosed that both Hylurgopinus rufipes Eich. and Scolytus multistriatus Marsh. seemed to be well established. More H. rufipes were trapped than S. multistriatus. Although beetle infestations in this year's trap logs were not nearly so heavy as in those set out in 1939, a fair quantity of beetles was destroyed in this bark-beetle-reduction program. Trap logs set out in other sections of the work area were cleared up at the same time.

Storm damage clean-up.--Thirteen crews were engaged during June in elm-sanitation activities to clean up storm-damaged trees in Montclair, Verona, Cedar Grove, Caldwell, North Caldwell, West Caldwell, and Millburn, in Essex County, N. J. Four additional crews worked on the removal of elm trees likely to become infested with bark beetles. Approximately 95 percent of the standing trees containing potential beetle material had been removed by the end of the month. Clean-up of storm-damaged elms was half completed in the town of Morristown, Morris County, N. J.

First-record elm disease infections.--First records reported during the month involved two Pennsylvania townships. Confirmations were reported from Upper Merion Township, Montgomery County, and from the borough of Yardley, Bucks County, adding 15.5 and 0.87 square miles, respectively, to the Pennsylvania infected zone.

Scolytus emergence.--During the first week in June a heavy emergence of Scolytus multistriatus was noted in the southern section of the New Jersey infected zone. Observations disclosed heavy beetle attack in the piles of logs set out as traps.

Gypsy moth inspections.--Among the bulk inspections for gypsy moth infestation during the month were 10,000 birch tree tops ranging in length from 2½ to 3½ feet. They were shipped from the Westfield, Mass., district to La Porte, Ind., to be kiln-dried, dipped in a silvering solution, and manufactured into novelties. The district inspector at Manchester, Conn., certified under the Japanese beetle quarantine 380 tons of leafmold that was trucked to a nearby nursery, where it was combined with peat moss and stored for use as a packing for dormant rose bushes during the shipping season. A carload of feldspar, another of cable reels, 6 cars of lumber, 7 truckloads of rough granite, and a truckload of fireworks trellis comprised the items from which gypsy moth larvae were removed in the course of the inspection of material presented for certification. One hundred and thirty-five caterpillars were removed from products destined to various points in Connecticut, New Jersey, New York, and Maine.

Gypsy moth larvae in various stages of maturity.--Owing to the cold and rainy spring and summer in the New England States, gypsy moth larvae varied in their degree of maturity in various sections of the infested zone. From Concord, N. H., the district inspector reported very heavy gypsy moth feeding. He anticipated heavy defoliation. Heavy feeding of the caterpillars and partial defoliation were quite noticeable in eastern Massachusetts where woodlands in the vicinity of the granite quarries at Weymouth, Hingham, and Chelmsford were already from 25 to 60 percent defoliated. In these three towns the caterpillars, in search of food, were crawling across the quarries and freshly cut building granite. Many of these caterpillars were fully grown and ready to go into pupation on the granite and later deposit their eggs on it after the emergence of the moths.

Late gypsy moth hatch.--One of the New Hampshire district gypsy moth inspectors reported that he observed gypsy moth eggs hatching on the north sides of trees in Jackson on June 4 and at Gorham on June 6. This is unusually late. Both of these towns are in the White Mountain region where the late spring and heavy snow probably delayed hatching.

Brown-tail moth defoliation.--Heavy feeding and complete defoliation of apple orchards by brown-tail moth caterpillars were reported by district inspectors in the Concord, N. H., district, at Poland, Maine, and in towns along the coast from Salisbury, Mass., to Portsmouth, N. H.

FOREST INSECT INVESTIGATIONS

Ethylene dichloride emulsion controls root crown girdler of pine.--J. V. Schaffner, Jr., New Haven, Conn., reports on experiments conducted in September 1939 and in June 1940 in a plantation of Corsican and Scotch pine at Weston, Mass., to find a satisfactory method of controlling Hylobius radicis Buch. Eight insecticides were tested and, of these, ethylene dichloride emulsion (25%) proved to be most efficient and satisfactory. (For preparation of the emulsion, see E-424, "Ethylene Dichloride Emulsion for the Control of the Peach Borer.") This stand of Scotch and Corsican pine was planted in 1926. It is situated on one of the metropolitan water sheds where the topography is slightly rolling and the soil is fine sandy loam. Shortly after the hurricane of September 21, 1938, it was discovered that most of the trees were severely injured by H. radicis. In the first series of experiments the ethylene dichloride emulsion was applied September 13, 1939, around the base of the trees as a spray, using a compressed-air knapsack sprayer. Eighteen pints were used to treat 12 trees averaging 4.96 inches in diameter at the base. This treatment, which averaged 1½ pints per tree, killed all larvae of H. radicis without any apparent injury to the trees. On June 5, 1940, 14 trees, averaging 4.58 inches in diameter at the base, were treated. In this experiment the emulsion was poured around the base of each tree from a tin graduated quart measure, using ½ pint for trees under 4 inches in diameter and 1 pint for those over 4 inches. An examination of these trees on June 27 disclosed that only 1 tree contained living larvae. This tree, which was 6.5 inches in diameter at base, contained 11 dead and 4 living larvae. It was the largest tree treated in this series and the most heavily infested. Although these experiments were not conducted on a large scale, the results thus far obtained show that ethylene dichloride emulsion is very effective in killing H. radicis larvae, whether applied in the fall or spring.

Cold, wet weather retards development of spruce sawfly larvae.--P. B. Dowden, New Haven, reports that development of larvae of the European spruce sawfly (Gilpinia polytoma Htg.), at centers of heavy infestation in southern Vermont and southern New Hampshire has been considerably retarded this season on account of unusually cold and wet weather. In 1939 most of the first-generation larvae were in the fourth and fifth instars by the end of June, some larvae were already spinning cocoons, and heavy feeding was noticeable in the severely affected stands. This year most larvae were still in the third instar and feeding was not noticeable, although fifth-instar larvae could be found in small numbers. At the Marlboro, Vt., plot 3.18 inches of rain fell between May 23 and July 1, 1939, whereas 9.40 inches of rain were recorded for the same area between May 27 and July 1, 1940.

Control of Pineus pinifoliae on white pine.--R. H. Nagel, of the forest-insect laboratory at Coeur d'Alene, Idaho, gives some preliminary results of experiments directed toward the control of Pineus pinifoliae, a destructive insect pest of white-pine reproduction. Mr. Nagel states this insect can be readily controlled if treatment is made soon after the eggs have hatched. Nicotine sulfate, nicotine sulfate and oil, as well as derris and sulfonated castor oil, all gave entirely satisfactory results, with no apparent injury to the foliage. This insect has caused considerable damage in areas of white-pine reproduction and plantations.

Mountain pine beetle control.--A. L. Gibson, Coeur d'Alene, reports that recent experiments indicate the possibility of using a penetrating spray in the control of the mountain pine beetle in western white pine. A series of short white pine logs were treated under controlled conditions with a saturated solution of orthodichlorobenzene and naphthalene flakes in different proportions of fuel oil. As even the weaker solutions, intended as the lower extreme of these experiments, resulted in practically a complete brood mortality, the results obtained can be considered as promising. To test the effectiveness of this spray under field conditions, a large, thick-barked, heavily infested white pine tree was felled and treated with a medium concentration. Although a large portion of the overwintered brood had already emerged from the basal portion of the bole, nearly all of the remaining larvae, pupae, and new adults were destroyed. Should further field tests prove the effectiveness of this treatment in white pine, the adoption of this method of treatment may offer a lower cost of control.

Late-season attacks by Scolytus multistriatus not successful.--Members of the Morristown, N. J., laboratory have noted that when adults of the smaller European elm bark beetle (Scolytus multistriatus (Marsh.)) attack elm material late in the season, they are not successful in producing progeny the following year. An experiment begun by C. H. Hoffmann in 1939 illustrates this fact. Elm trees were cut at intervals and left in the field for a time before being cut into sections and placed in rearing containers at the laboratory. There has been no emergence of S. multistriatus adults this year from trees cut on and after September 15, 1939, even though attack was noted last year on trees cut as late as October 6. It is evident that, although beetles may lay eggs late in the season, larvae hatching from these eggs are not able to develop.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Gypsy moth spraying season moderately successful.--The type of weather prevailing during June governs, to a large degree, the success of the gypsy moth spraying program. Hot dry days cause the spray solution to dry quickly and allows the maximum quantity to adhere to the foliage. Calm days permit the spray to reach the tops of the highest trees and drift down through the foliage; whereas high winds flatten out the spray stream, making it difficult to cover the higher tree tops, and interfere with the uniform coverage of the foliage by the spray solution. General spraying began on June 3 under ideal conditions which persisted throughout the week, being followed by a week of unsettled weather. Frequent showers and heavy fogs saturated the foliage in most New England localities and to a lesser extent in Pennsylvania. There was a marked absence of sunshine and little movement of air during the brief periods when spraying was possible, and enough of the lead arsenate would have been washed from the leaves to necessitate respraying of much of the area, had it not been for the fish oil now regularly added to the solution as an adhesive. The weather during the week ended June 22, when most of the spraying work was concluded, was even worse. Unseasonably low temperatures prevailed throughout New England during the latter part of the week, with killing frosts and snow flurries in some localities, and daily strong winds. These conditions prevented the satisfactory spraying of high growth on exposed elevations and it was necessary to confine the work to sheltered spots. Spraying work in all States except New York was discontinued by the middle of the last week in June so that there would be sufficient time to wash the hose and other equipment and move it to the storehouses before the termination of W. P. A. gypsy moth work for the month. Little actual spraying was accomplished during the first part of the final week, as heavy showers made such work impracticable. As the season had been cold and backward before the spraying work started, the hatching of the gypsy moth eggs was delayed and the development of the caterpillars was slower than usual. Because of this, it would have been possible to extend the spraying season well into July, with better results, had employment considerations been favorable and sufficient spraying material available.

Work performed during gypsy moth larval season.--In Vermont some gypsy moth scouting work was done during the first part of the spraying season, chiefly in the northern section of the barrier zone. This work was somewhat slowed up as the foliage became more dense and interfered with the close examination of the tree tops. It was necessary to dismiss 50 men from the W. P. A. rolls on June 12 but a few crews were retained to continue scouting in important localities in Orleans and Lamoille Counties, where no scouting had been done for several years. Two spraying crews were retained to complete the spraying work planned in Bristol and Middlebury Townships, in Addison County, and a small force was also used to patrol burlap-banded trees at infested locations in Addison and Rutland Counties. These crews found and crushed only a few gypsy moth larvae at a majority of the sites visited, which indicates that these infestations are relatively small. In Massachusetts each of the 7 sprayers in the barrier zone area started operating on two 6-hour shifts, permitting continuous spraying for 12 hours daily, but it was necessary to reduce some of them to a single-shift basis because of the daily resignations of workers to enter private employment. All foliage had developed sufficiently to hold the spray satisfactorily at the beginning of the spraying season, except that of swamp white oaks, which are comparatively rare. The work progressed through the month with no interruption from mechanical failures. Water supplies held out during the season, although it was necessary to conserve them on some of the smaller streams by building temporary earthen dams, so that the water would accumulate during the night for use the following day. In some cases it was necessary to use great care in spraying wood edges bordering hayfields and grazing land, so that the strong shifting winds that prevailed at times would not blow the spray into the fenced areas. Large numbers of gypsy moth caterpillars were crushed by men patrolling burlap bands at infested locations east of the barrier zone area, but the larvae were much less abundant at banded infestations within the barrier zone. In Connecticut the labor problem was also acute. In the barrier zone 8 sprayers started work, 6 on a 12-hour double-shift basis and 2 on an 8-hour single-shift, but this schedule could not be maintained. On days unfit for spraying the workers were detailed to burn brush, band trees with burlap, and patrol trees already banded to destroy all gypsy moth caterpillars hiding in the shelters. Spraying from the autogiro, in cooperation with the State entomologist, was begun on June 7 near Granby and over 400 acres of woodland was treated during the season. In New York, owing to heavy rains during the first part of the last week in June, arrangements were made for the State conservation department to continue gypsy moth spraying work up to the last day in the month, with the understanding that C. C. C. or regular State employees would wash the hose and deliver it to the storehouse during the first week in July. In Pennsylvania woodland spraying for the gypsy moth was started on June 3, with 27 machines operating, 15 of which worked on the double-shift basis, and the remaining 12 on single-shift. Twelve of the sprayers had been used previously on residential spraying work. Fifteen sprayers operated in 7 townships in Lackawanna County, 8 sprayers in 3 townships in Luzerne County, 2 sprayers in 2 townships in Carbon County, and 2 other sprayers in 2 townships in Monroe County. The sprayers operated on a double-shift basis discontinued work on June 22, and those on single-shift by June 26. Although the spraying season was short, much work was accomplished, including all the important isolated infestations in Mauch Chunk and Lehigh Townships, in Carbon County, and in Clifton and Covington Townships, in Luzerne County.

All sprayers in field visited daily by mechanics.--Mechanics from the gypsy moth repair shops, traveling in small trucks equipped with complete sets of tools and carefully selected sets of replacement parts, were constantly in the field during the spraying season. They made regular daily inspections of all sprayers and were prepared to make adjustments or repairs on any of the various types of sprayers and motor vehicles in use at that time. Each spraying machine was visited at least once a day, and those operated continuously for 12 hours on the double-shift basis were visited twice each day when possible. It often happens that minor repairs and adjustments made at the proper time prevent important delays that would otherwise occur, and serious and costly breakdowns of spraying machines during the gypsy moth spraying season have been rare since this activity first adopted the practice several years ago of daily visits by competent mechanics.

All W. P. A. gypsy moth work suspended.--As project applications for W. P. A. gypsy moth work during the fiscal year 1941 had not been approved by the end of June, the services of all workers assigned to gypsy moth projects in the States of Connecticut, New York, and Pennsylvania were terminated on the last working day in June, and workers in Vermont and Massachusetts were advised that work was suspended until the project applications for these States had been approved. These arrangements were based on information obtained from the W. P. A. Division of Employment in each of the States concerned. As it is not definitely known when the project applications will be approved, arrangements have been made to assemble all regular agents who can be spared from other work at the storehouses in Massachusetts and Pennsylvania to test the hose and place it in storage. This work is necessary in order to minimize the deterioration of the hose from exposure to the sun on hot, humid days. Other regular employees were engaged in inspecting fences erected to exclude animals from the sprayed areas and in examining sites where sprayers had been set up during the spraying season to make certain that all traces of lead arsenate had been removed and the areas left in good order.

Spray hose damaged by hedgehogs.--Lines of gypsy moth spray hose extending over ledgy ground in dense woods in regions where hedgehogs are abundant in Bristol and Middlebury Townships, Addison County, Vt., were gnawed by these animals. This type of damage has been noted several times during the last few years, the first occurring in Massachusetts in 1935. On this occasion the fabric underlying the rubber covering on several lengths of hose was so seriously damaged by these animals that the hose burst when subjected to high pressure.

C. C. C. gypsy moth work during June.--The amount of time spent on gypsy moth work during June ranged from a high of 2,200 6-hour man-days in the first week to a low of 1,555 man-hours for the week ended June 29. The reduction in work was due partly to stormy weather and partly to the completion of an enrollment period. The quarterly ending of enrollment periods seriously interferes with the volume of work accomplished, as men who have accumulated leave are discharged in advance of the final date for the period, leaving the crews shorthanded, and considerable time must also be used in instructing the new enrollees and training them for their duties at the beginning of each new enrollment period. Spraying selected areas with lead arsenate was the principal activity in Massachusetts and Connecticut during June, the spraying equipment having been supplied by the Bureau of Entomology and Plant Quarantine and the State of Connecticut, and the insecticides by the C. C. C. camps and the State of Connecticut. Some thinning and tree-banding work was also done. As no spraying equipment was available for C. C. C. spraying work in Vermont, the work in that State consisted mainly of thinning and burlapping. C. C. C. spraying work was begun on May 27 at several locations where the foliage had developed sufficiently to hold the poison and was extended to other areas as the leafage unfolded. Although the rainfall during June was slightly below normal, the storms were so scattered through the month that the water supply remained adequate for spraying purposes at practically all locations. Moving the spraying machines from one location to another, setting up the equipment and laying new hose lines caused the loss of some time from actual spraying work. This is in contrast with last year's work, when most of the C. C. C. gypsy moth spraying was done in one block and extensive moving of equipment was not necessary. There were no serious delays caused by the breakage of equipment or hose. All of the sprayers used by the C. C. C. in Connecticut, and three of the four machines used in Massachusetts, were used on the double-shift basis until near the end of the month, when the return of some of the enrollees to their base camps to prepare for discharge made it necessary to reduce the work to single shifts. The excellent cooperation of property owners and various State and C. C. C. officials enabled the crews to accomplish a great deal of spraying work. In one case a Water Board property in Massachusetts donated 1 ton of lead arsenate for use by the C. C. C. in spraying infested Water Board property adjacent to other areas already sprayed by the C. C. C., thus aiding materially in controlling the gypsy moth in that region.

Dead trees noted in areas previously defoliated by gypsy moth. A considerable number of dead and dying chestnut oak, white oak, hemlock, and some white pine trees were noted by C. C. C. officials during a field trip in Connecticut. These casualties followed 1- or 2-year defoliation by the gypsy moth. A similar condition was reported in oak trees in Vermont.

PLANT DISEASE CONTROL

Stem rust in Middle West.--The rust situation in the Middle West on July 10 has been summarized by E. C. Stakman, in charge of rust surveys, as follows: "There are now indications that stem rust will cause considerable damage in the east-central part of Kansas this year. About a third of the wheatfields have been severely damaged in the Emporia, Florence, Eldorado, Newton, and McPherson areas. Fields of Chiefkan, however, of which there are many, show no kernel shrinkage. Although rust has increased considerably on late wheat in Iowa, particularly weak-strawed varieties in which there has been lodging, heavy infection is not general enough to cause more than slight loss for the State as a whole. The varieties Iowin and Iobred have been resistant wherever examined. Wheat was being cut last week. Along the western edge of the winter-wheat belt there is practically no stem rust infection, according to recent observations made between Perryton, Tex. (in the northern Panhandle), and Scottsbluff, Nebr., where all grain was ripe. On July 7, ripe wheat in extreme northeastern Colorado, in Sedgwick and Phillips Counties, had only a trace of rust."

Stem rust causing some damage in Illinois and Indiana.--Damage in central Illinois has been less severe than expected earlier in the season, for rust has caused little injury in the southern or central parts of the State. In southern Wisconsin only negligible damage is expected to winter wheat. Indiana wheat is escaping serious damage by maturing before rust becomes severe, but some damage has been done. It is estimated for Ohio that rust has caused 1-percent damage to wheat and a trace of damage to barley. Wheat has matured in the southern and central parts of Ohio, Indiana, and Illinois and is now in soft- to hard-dough stage as far north as southern Wisconsin. Considerable variation in the stage of development of wheat in Pennsylvania will be responsible for injury to late fields there, and in some sections of Virginia barley, rye, and wheat have been damaged. Winter wheat in southern Minnesota will escape serious stem rust damage in the aggregate. It now appears that injury will be limited to spots in which heavy infection has developed and where considerable rust has appeared on the necks of plants. On the whole, however, damage will not be serious. Barley also will escape loss unless rust increases very rapidly. Grains in Minnesota are somewhat later than a year ago, winter wheat ranging from medium dough to ripe, barley mostly in medium dough, and spring wheat in soft dough.

Rust on susceptible spring wheat in southern Minnesota.--Moderately heavy rust has developed on the few fields of susceptible spring wheat that can be found in southern Minnesota. One field of Ceres wheat observed on July 4 in the milk stage had 15 or 20 percent of rust on 75 percent of the stems, and pustules were just breaking out on the necks. With 3 weeks remaining before harvest, there is opportunity for considerable damage under favorable conditions. The amount of susceptible wheat in the State, however, is very small. Thatcher wheat in the same area had only a trace of rust. A large increase in the number of stem rust spores was noted on slides exposed at St. Paul on July 5 and 6. From present indications, drought is likely to be more destructive than rust on spring wheat in the

Dakotas. Harvest is now well under way in southeastern South Dakota and heavy rust infection is present in only a few late fields of winter wheat.

Progress maps for county agents offices in Iowa.--To promote closer working relations with county agents in Iowa where barberry-eradication crews are operating, a 17- by 22-inch map mounted on a good grade of pressboard large enough to allow for a suitable margin is hung in a conspicuous place in the county agent's office. Map tacks of contrasting colors are used to designate properties in the county that have been found infested with barberry bushes. A legend in the upper right-hand corner and a short statement relative to the barberry situation in the county make the map a rather complete demonstration in itself. According to Arlo H. Hagge, assistant State leader in Iowa, new tacks are added to the map as new properties are found, thus the county agent and farmers who visit his office are kept currently informed of progress both with respect to area covered and bushes destroyed.

Progress in control operations with emergency funds.--Since emergency funds were first used in Iowa in 1933 for barberry-eradication work, more than 113,000 barberries have been destroyed on 3,953 properties. More than 31,000 square miles have been intensively surveyed by these P. W. A. and W. P. A. crews of men. Resurvey work has been carried on in conjunction with the regular survey and all former bush properties within the area have been carefully reinspected. During the last 5 years, 25 percent of all Iowa resurvey properties have been rechecked and barberries have been found on 23 percent of the old locations. It is of interest that the area covered since 1933 comprises much of the rough, wooded area of the State. The results indicate clearly the value of this labor program and emphasize the need for continuing this or some similar type of work.

Funds used	Area surveyed	Properties with barberry bushes	Barberry bushes destroyed
	Square miles	Number	Number
P. W. A.	3,372	1,251	50,322
W. P. A.	27,245	2,702	63,022
Total	30,617	3,953	113,344

Blister rust control program for 1940 in sugar-pine region.--Plans for blister rust control work in the sugar-pine region for 1940 call for the employment of 3,110 men. More than 2,000 of this number were actively engaged in *Ribes*-eradication work during May, and the remainder were being placed as fast as camps could be constructed and manned. This force is expected to cover approximately 185,000 acres of timbered land during the current field season. There will be 40 camps established in the sugar-pine region, extending from the Siskiyou National Forest of southern Oregon southward through the Klamath National Forest, Lassen Volcanic National Park, and Lassen, Plumas, Eldorado, and Stanislaus National Forests, thence to the Yosemite and General Grant National Parks and the Sierra National Forest. Four Federal agencies are engaged in control work, namely, the Forest Service, the National Park Service, the Oregon and California Revested Lands

Administration, and the Bureau of Entomology and Plant Quarantine. The last-named agency acts in a technical supervisory capacity for all field operations within the region, as in previous years. The work is distributed by agencies as follows: Forest Service, 7 C. C. C. camps composed of 640 men, 8 E. R. A. camps composed of 600 men, and 7 regular camps composed of 235 men. This totals 22 camps composed of 1,475 men. The National Park Service has 9 C. C. C. camps composed of 665 men, the Bureau of Entomology and Plant Quarantine 8 E. R. A. camps composed of 910 men (2 camps and 220 men in Oregon), and the Oregon and California Revested Lands Administration has 1 C. C. C. camp of 50 men (in Oregon). This makes a grand total of 40 camps containing 3,110 men. The greater part of the work outlined in the program for Ribes eradication will be done on the Plumas and Eldorado National Forests. At the beginning of the present season a total of 780,251 acres within established control units had been given initial treatment and of this area a large part had received two or more successive workings to maintain full protection from the disease. The scouting work performed during 1939 indicated that white pine blister rust was comparatively inactive during that year. This was encouraging to the control forces, which had faced a rapid expansion of the rust during the previous 3 years.

W. P. A. employee proves good blister rust scout.--The "Man of the Week" among the W. P. A. workers in Jackson County, Mich., is Floyd McCrum, who, after being shown a sample blister rust canker, set out to find the disease in Jackson County, where he is employed on the local blister rust control project. He succeeded in finding two fruiting cankers, one on 1935 wood and the other on 1936 wood, in the pine area they were protecting, a 9-acre, 20-year-old plantation. This was the first pine infection ever found in this county and was an important discovery, as it extends the range of known pine infection about 30 miles farther south and close to the Ohio border. As this infection is far removed from any known active infection and in a county having practically no native pine, it shows that no pine area in the State is safe from the rust as long as Ribes grow nearby. A few days later, on June 28, Mr. McCrum brought in the first infected Ribes leaves ever reported in Jackson County. The infected leaves were from R. cynosbati bushes and showed the uredinial stage of the disease.

Reconnaissance of sugar pine control units in California.--Early in June a small reconnaissance party was sent to the Trinity National Forest in northwestern California to make a survey of previously established sugar pine control units in order more definitely to evaluate the sugar pine stands and more precisely to delimit the boundaries of the units. The party consists of six picked W. P. A. workers, all of whom have had several seasons of experience in Ribes eradication, a cook, and the chief of party. The reconnaissance is based on the public land survey of township and section (640 acres). Four strips each 1 mile long and 16½ feet wide, spaced at 20-chain intervals, are run through each section. For the entire length of each strip Ribes are counted and recorded by 1-chain transects; on 1/10-acre plots distributed along the strip at intervals of 10 chains, sugar pines are counted by four size classes. Summaries are made of both sugar pines and Ribes on a per-acre basis for each section. In the course of the reconnaissance, section corners of the land survey must be found and properly posted with metal tags in order to facilitate later work in the region. As the original surveys date from the last quarter of the last century, relocation work often involves much ingenuity. Through the end of June, 44,500 acres of sugar pine type in one of the major units were examined, which, according to the data gathered, support a per-acre average of 17 Ribes and 97 sugar pines of all sizes. The species of Ribes so far found are R. cruentum, R. lacustre, R. navadense, and R. lobbii. Many sections were found to support exceedingly small populations of Ribes, even along streams, and the maximum density per section is about 100 bushes per acre. Most of the Ribes are confined to the vicinity of streams and draws. In the area thus far sampled the sugar pine is not to be compared in quality with that occurring in the optimum range of the species in the central and southern Sierra Nevada. It largely occurs on sites 2 and 3. However, comparative scarcity of Ribes, which would render the cost of protection against white pine blister rust relatively low, places this unit higher in the scale of priority of protection than would otherwise be the case. Some of the time of the chief of party is spent in an ocular appraisal of other white pine stands on the forest. The value of the pine in most of these stands is questionable and should be determined by reconnaissance surveys similar to the one now in progress before protective work is undertaken. One unit, however, which lies in the northeastern part of the forest and the adjoining part of the Shasta Forest, was found to support a good stand of sugar pine. A few sample plots taken at random showed that this stand supports from 40 to 800 trees per acre and that the count on from 40,000 to 50,000 acres would average about 200 sugar pines of all size classes per acre. In this unit, also, Ribes appear to be unusually sparse.

COTTON INSECT INVESTIGATIONS

Calcium arsenate and mixtures of calcium arsenate and sulfur for boll weevil control.--Tests were made at State College, Miss., in 1938 and 1939 by R. L. McGarr to compare the efficacy of calcium arsenate and 1-to-2 and 1-to-1 mixtures of calcium arsenate and sulfur, and also to compare small plots (1/10 acre) with large plots (2/3 and 3/5 acre) for control of the boll weevil. In 1938 the average gains of seed cotton and profits per acre for 12 1/10-acre randomized-plot tests where the boll weevils were fairly abundant and an average of 4 effective poison applications had been applied, were as follows: For the 1-to-2 mixture, 300 pounds of seed cotton and a profit of $7.05; for the 1-to-1 mixture, 294 pounds and a profit of $6.46; and for the calcium arsenate alone, 266 pounds and a profit of $6.16. The average production for the 12 check plots was 1,082 pounds per acre. In 3 2/3 acre-plot tests in early planted cotton, where the boll weevil infestation was not high and an average of 2.7 effective poison applications had been made, the calcium arsenate alone gave a gain of 145 pounds of seed cotton and a profit of $2.85 per acre, as compared with 91 pounds and a profit of $0.57 per acre for the 1-to-2 mixture. The average yield for the three check plots was 1,096 pounds per acre. In 3 2/3-acre plot tests in late-planted cotton where the boll weevil infestation was heavy and an average of 6 effective poison applications were applied, the 1-to-1 mixture showed a gain of 666 pounds and a profit of $17.84 per acre, as compared with a gain of 626 pounds and a profit of $17.37 per acre for the plots treated with undiluted calcium arsenate. The average production for the 3 check plots was 1144 pounds per acre. In 1939 the average gains of seed cotton and profits per acre for 10 1/10-acre randomized-plot tests, where the boll weevils were abundant and the bollworm infestation was light to moderate late in the season, were as follows: For the 1-to-1 mixture, 763 pounds and a profit of $20.81; for the calcium arsenate alone, 698 pounds and a profit of $19.79; and for the 1-to-2 mixture, 616 pounds and a profit of $16.01. The average production for the 10 check plots was 588 pounds per acre. An average of 8 effective poison applications were made of each treatment. In 4 3/5-acre randomized-plot tests in the same field with the 1/10-acre plot tests, where the boll weevil infestation was heavy and the bollworm infestation was moderate late in the season, the 1-to-2 mixture gave an average gain of 628 pounds of seed cotton and a profit of $18.11 per acre; the 1-to-1 mixture, 620 pounds and a profit of $17.46; and the straight calcium arsenate, 570 pounds and a profit of $16.64. The average yield per acre for the 4 check plots was 517 pounds. An average of 5.8 effective poison applications were made of each treatment, or 2.2 fewer poison applications were needed to control the weevils in the larger plots than in the 1/10-acre plot tests. In both years the mixtures were used in all tests at the rate of 12 to 14 pounds per acre and the calcium arsenate at 6 to 7 pounds per acre. The large increases in all the tests in 1939 were not only due to the control of the boll weevil but also in part to the control of the bollworm. The bollworm damage was in proportion to the amount of calcium arsenate applied, the damage in the treated plots being the highest where the 1-to-2 mixture was used. The yield records for the 2 years' tests showed that calcium arsenate and the 2 mixtures were about equally effective in controlling the boll weevil and that each gave good results. The yield records indicated that plots 1/10 acre in size were very satisfactory for experimental purposes in controlling the boll weevil.

Pink bollworm situation in lower Rio Grande Valley.--Investigations made at the Brownsville, Tex., laboratory, in cooperation with the Division of Pink Bollworm and Thurberia Weevil Control, are briefly summarized, as follows: Examination of 7,980 cotton squares from 65 fields in 7 localities within a 25-mile radius of Brownsville, Tex., between April 25 and May 13, gave negative results so far as the pink bollworm was concerned. A few squares were infested with Noctuelia rufofascialis Stephens. The first pink bollworm found in 1939 was collected in a cotton bloom on May 1, but in 1940 the first collection was not made until May 13, when the first pink bollworm was found in a cotton bloom. Between May 13 and 31 a total of 854,345 blooms were examined in 430 fields, and 20 fields, or 4.6 percent, were found to be infested and a total of 79 pink bollworms were collected from the blooms. On the American side 32 pink bollworms were found in 11 fields in Cameron County and 1 in Hidalgo County. All were found adjacent to or not far from the Rio Grande between Brownsville and Weslaco, south of Highway 83. On the Mexican side of the river 46 infested blooms were found along the river for a distance of 35 miles between Matamoros and Rio Rico, 24 of these being found in 4 fields located from 5 to 18 miles northwest of Matamoros and 22 within 6 miles of Rio Rico. Bloom-infestation records indicate wider distribution of the pink bollworm than in 1939. Last year infested blooms were found only 9 miles northwest of Brownsville, whereas this year an infestation in blooms was found 45 miles northwest of that city. In 1939 infested blooms were found 16 miles northwest of Matamoros while in 1940 an infestation was found in blooms about 35 miles northwest of that city. No pink bollworms have been found in okra since last December. Pink bollworms were not found in May 1940 in any host plant except cotton.

Naphthalene ineffective against thrips and aphids on cotton.--Based on reports that naphthalene dust was being recommended for thrips and aphids on cotton, M. T. Young and assistants conducted a test against thrips at Tallulah, La., during June. They used 1/40-acre plots arranged in randomized blocks with six replications. A commercial mixture of 60 pounds of ground crude naphthalene and 40 pounds of calcium carbonate was applied to small cotton at the rate of 19 to 20 pounds per acre in the early morning, at midday, and late in the afternoon. Two applications failed to reduce the population below the checks, which averaged 2.7 thrips per plant. No records were made of the effect on aphids, as very few were present at the time the tests were begun. However, in tests against aphids conducted by E. W. Dunnam at Stoneville, Miss., no mortality of aphids was obtained with 25, 38, or 60 pounds of naphthalene dust per acre.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Lower Rio Grande Valley.--Planting of the cotton crop in that portion of the south Texas regulated area designated as the lower Rio Grande Valley was restricted to the period February 20 to April 20 for the 1940 season as one of the principal measures in the program for suppressing the pink bollworm in that area. The first open cotton bolls of the season were found about the middle of June, this field having been planted on the opening date of the restricted-planting period. There was an elapsed time of approximately 4 months from the date the field was planted until the first open bolls were noted. The active 1940 cotton season opened in that area with the ginning of the first bale of cotton on June 28. Regulations promulgated by the State require that cottonseed be sterilized as a continuous process of ginning for the 1940 cotton crop in the lower valley counties. Consequently, there was considerable activity in that area during June in regard to the installation of sterilization units in gins not previously equipped for such operation. Most of the sterilizers being installed in that district are of the dry-heat type developed by this Division last season.

Inspection of okra in lower Rio Grande Valley.--The finding of pink bollworm infestation in okra fields in the lower valley district around the close of the 1939 cotton season, resulted in an amendment to the pink bollworm quarantine, requiring inspection and certification for the movement of okra out of the regulated area. The 1940 spring okra season opened in May, and inspection and movement of this material continued to be fairly heavy throughout June. For the period, 223,418 okra forms were inspected, with negative results as to pink bollworm infestation. Since the beginning of okra inspection for the present season, 340,071 forms have been examined, and no infestation has been found. At the end of June, 152 dealer-carrier permits had been issued for the movement of okra outside the regulated area; however, at the end of the period 33 growers had discontinued shipping.

The Coastal Bend district.--This area under regulation on account of the pink bollworm lies directly north and northwest of the lower Rio Grande Valley, embracing practically all cotton-growing counties from Nueces on the east to Maverick on the west. The eastern part of this area was brought under regulation in 1938 as a result of pink bollworm findings in that same year, and was extended across the State to the west in 1939 as the result of spread of the pink bollworm from the focal point near Brownsville, in the lower valley area. Very favorable conditions for the development of the cotton crop prevailed throughout that area during June. Lack of moisture in some sections, and destruction of the crop by storms in others, resulted in considerable late planting and replanting, and at the end of the month cotton could be found in all stages of growth from plants containing open bolls to fields that had been recently planted. The ginning season is expected to open in that area around July 15, but it is not believed there will be any considerable amount of cotton ginned prior to August 1. Sterilization of seed as a continuous process of ginning was required for the 5 original Coastal Bend counties for the 1939 crop. This regulation, however, was not put into effect last season in the new counties involved through pink bollworm findings in the 1939 crop, as infestation was not discovered in that area until late in the season and facilities were not available for the sterilization of seed as ginned. For the present season, however, regulations require the sterilization of seed at all gins operating within the Coastal Bend district, and at the end of June sterilizers had been installed or were in process of installation at practically all gins.

Situation in the Big Bend.--Cooperative control measures carried out in the Presidio-Ojinaga area of the Big Bend of Texas and Mexico under the 2-year plan for the years 1938 and 1939, which brought about such outstanding results in the reduction of the heavy pink bollworm infestation in the 1939 cotton crop, were again put into effect in that area for 1940. Suppressive measures under this plan, calling for the cleaning of fields immediately after harvesting, a delayed-planting date, and the destruction of all stub cotton so as to deprive pink bollworm moths of food until the peak of spring emergence is over, have been carried out very successfully on both sides of the Rio Grande. Conditions during June have been favorable for the development of the cotton crop and the first blooms occurred in the Presidio Valley around June 20 from cotton planted April 20, the beginning of the restricted-planting period. Toward the close of June bloom-infestation counts were being made in the earliest planted fields in the Presidio Valley by the Cotton Insect Research Division to determine the results of the control program with reference to pink bollworm infestation in the 1940 cotton crop.

Control in Arizona.--The program for the removal of stub cotton throughout the State of Arizona, which was made possible through cooperation of the Agricultural Adjustment Administration with the State of Arizona and this Bureau, for the purpose of creating an effective host-free period for the pink bollworm prior to the fruiting of 1940-planted cotton, was concluded at the end of May, as set out in our report for that month. Inspection of cottonfields has been carried on throughout June to observe the general progress of stub cotton, a considerable amount of which reappeared in fields after conclusion of the program, and any plants far enough developed to constitute a danger to 1940 plantings were removed. The development of the 1940 cotton crop within the zone of control operations was retarded to some extent by the farmers through irrigation and cultural practices, in an attempt to extend the host-free period for emerging pink bollworm moths; and, as a result of such cooperation, very few blooms were present in the earliest planted cotton prior to June 10. In connection with the inspection of fields in regard to the development of stub cotton, inspectors have also been engaged during June in collecting data on planting, squaring, blooming, and fruiting dates of long- and short-staple cotton throughout all cotton-producing sections of the State. Such information is considered essential in carrying out control measures for the suppression of the pink bollworm having to do with the creation of starvation periods during the period of most active moth emergence.

Wild-cotton eradication in Florida.--The eradication of wild cotton from southern Florida and adjacent keys was begun several years ago when it was found that these plants were heavily infested with the pink bollworm. Such an undertaking was considered expedient in order to deprive this very destructive cotton pest of a host on which to propagate, and thus prevent its spread into domestic cotton-growing areas of the United States. Because of unfavorable weather conditions, no attempt is made to carry on eradication work in Florida during the summer months and, with the exception of some scouting activity (completed during the last 2 weeks of the period), this work was brought to a close on June 15. All of the area was cleaned twice last season and much of the acreage was gone over the third time. It is believed that the entire area is being left in very good condition, and that the program will not be endangered if eradication work can be resumed by the usual time in the fall. During the period worked in June, a total of 1,174 acres was recleaned, resulting in the finding of 5 plants with mature bolls and 19,772 sprout plants. Also, 27 mature plants were found along railroad rights-of-way, which had been cut back during previous seasons by railroad-maintenance crews.

Thurberia-plant eradication in Arizona.--The program for the destruction of *Thurberia* plants in the Tortillita and Santa Catalina Mountains of southern Arizona was brought to a close on June 15. This program was begun in 1935, when it was determined that these plants were heavily infested with a native boll weevil which was making its way to adjacent domestic cotton plantings. At the completion of this project all areas to be cleaned under the initial plan for this work had been covered twice and practically all of the Tortillita Range had been gone over 3 times. During the period worked in June, 2,560 acres were covered, resulting in the location and destruction of 1,431 *Thurberia* plants. Since the inauguration of this project in 1935, a total of 376,650 acres has been covered and 2,055,539 *Thurberia* plants have been destroyed.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Tobacco moth survives winter and breeds in packhouses.--C. F. Stahl and W. A. Thomas, of the Oxford, N. C., laboratory, found that larvae of *Ephestia elutella* (Hbn.) passed the winter in trash in packhouses of the tobacco growers and that adults appeared during the period April 11 to June 19. Adults of a new brood began to emerge in packhouses on the latter date. The moths emerged from a variety of materials collected as trash in packhouses, including shelled corn and corn in the shuck. Definite evidence was obtained at Farmville and Reidsville, N. C., that the tobacco moth moved during May from infested packhouses to nearby open-storage units of tobacco in hogsheads. As many as 6,187 adults of the tobacco moth were captured on flypaper strips suspended in a single large packhouse during the period April 30 to May 28.

Nicotine dust superior to rotenone dusts for cabbage aphid control.--In field tests conducted at South Point, Ohio, N. F. Howard and his associates of the Columbus, Ohio, laboratory, found that a dust mixture containing nicotine was superior, in controlling Brevicoryne brassicae (L.) on cabbage, to the rotenone-tobacco-dust-sulfur-dust mixture now recommended for turnip aphid control in the South. Sulfur nitride was ineffective and it was necessary to apply the nicotine dust mixture to these plots in order to prevent serious injury by the aphid. The grower was harvesting Grade A 1 cabbage from the plots treated with nicotine-dust mixture. A field of cabbage nearby, which was infested severely by the cabbage aphid and not treated with any insecticides, was practically a total loss. The plants were small and stunted. Although parasites and predators reduced the aphid population to a low point, this occurred too late to save the crop.

Toxicity of rotenone possibly influenced by diluent used.--An experiment was conducted by L. W. Brannon, of the Norfolk, Va., laboratory, for the control of Epilachna varivestis (Muls.) on beans near Drivers, Va., under conditions of unusually heavy infestation. The average infestation on 4 plots just prior to application was 36.5 beetles, 37.2 egg masses, and 1.5 newly hatched egg masses on 25 feet of bean row. The effectiveness of 6 commercially prepared rotenone-bearing dust mixtures was compared with that of 2 prepared in the laboratory. Based on analysis made by the Division of Insecticide Investigations, the treatments were applied so that approximately the same quantity of rotenone was applied per acre. Best foliage protection from beetle injury was obtained from the derris-talc mixture prepared in the laboratory to contain 0.5 and 0.75 percent of rotenone, there being no difference in the degree of control obtained by the 2 treatments. Following in order of effectiveness were commercial dusts No. 1, which contained 0.65 percent of rotenone, No. 2 with 0.71 percent, No. 3 with 0.88 percent, No. 4 with 0.79 percent, No. 5 with 0.95 percent, and No. 6 with 0.32 percent. It is interesting to note that commercial dusts Nos. 2 and 6 were so-called impregnated dusts, No. 2 being not quite so effective as the laboratory-prepared mixtures and No. 6 giving unsatisfactory control. A mixture of derris and tobacco dust containing 0.5 percent of rotenone, prepared in the laboratory, was not so effective as a derris-talc dust mixture similarly prepared to contain 0.5 percent of rotenone. This, together with the fact that dust No. 5 containing 0.95 percent of rotenone and No. 4 with 0.79 percent were not as effective as a laboratory mixture of derris and talc containing 0.5 percent indicates that the differences in the degree of control obtained with the different dusts may have resulted from changes in the toxicity of the rotenone as affected by the carrier used. This is further indicated by the fact that Dust No. 4 containing 0.79 percent of rotenone, and having clay as the diluent, did not give as good foliage protection against the beetle as the derris-talc mixture prepared in the laboratory to contain 0.5 percent of rotenone.

Toxicity of rotenone-bearing dust to pea weevil.--F. G. Hinman and W. E. Peay, of the Moscow, Idaho, laboratory, report from small-scale tests directed against Bruchus pisorum (L.) that a dust mixture containing 0.5 percent of rotenone and 1 percent of 2,4 dinitro-o-cyclohexylphenol proved to be more toxic to pea weevil adults than dust mixtures containing either of these component parts. They also report that the toxicity to the weevil of a dust mixture containing 0.5 percent of rotenone was not increased by the addition of 10 percent of paris green nor of 10 percent of cryolite.

Dinitroorthocyclohexylphenol compounds highly toxic to wireworms.--Preliminary tests conducted in the laboratory by C. E. Woodworth, at the Walla Walla, Wash., laboratory have shown several of the Dinitroorthocyclohexylphenol compounds to be very toxic to wireworm larvae (principally *Limonius californicus* Mann. and *L. canus* Lec.). Some of these compounds proved to be more than 50 times as toxic as dichloroethyl ether. The toxicity of aqueous dilutions was apparently increased when soil was added.

Seedlings may be injured by dichloroethyl ether treatment.--Although previous experiments have shown that dichloroethyl ether, within prescribed limits, has given evidence of promise as an effective soil treatment against certain wireworms in the West, recent studies conducted at the Alhambra, Calif., and Walla Walla, Wash., laboratories, have definitely shown that this treatment will injure certain plants. At Alhambra, R. E. Campbell found that a solution containing 1 to 12 cc. of dichloroethyl ether per gallon of water had no deleterious effects whatever upon the germination of watermelon seed under laboratory conditions. However, there was some indication that a concentration of 9 cc. per gallon impaired germination in the field (1 quart to the hill at seeding time). He also found that in most instances concentrations greater than 3 cc. per gallon of water at the rate of 1 to 2 quarts per hill caused mortality or seriously injured newly set tomato plants. R. S. Lehman, Walla Walla, found that a single application of dosages ranging from 1/2 to 3/4 cc. of dichloroethyl ether per hill at the time of seeding, on field corn, caused definite chemical injury to the growing plant. Sweet corn exhibited no injury from a single application of the treatments, but did show injury after two applications.

Progress in discovery of sugar beet strains resistant to beet leafhopper.--Studies by F. R. Lawson at Twin Falls, Idaho, to determine the possibilities of discovering a sugar beet resistant to *Eutettix tenellus* (Bak.) showed that considerable differences were found in the number of leafhopper eggs deposited in five strains of beets. Analysis of the data showed that leafhoppers oviposited more freely on the larger plants, regardless of the strain, and that there was actually no significant difference between strains when the areas and volumes of the leaves under test were considered. The differences in production of living leafhoppers on six inbred strains and a check were highly significant, which is believed to be a measure of plant resistance to the beet leafhopper. It has also been found that certain individuals and strains of beets develop lesions at the points of injury where leafhopper eggs are deposited in the petioles and veins, the eggs being forcibly extruded from the tissues before hatching occurs.

INSECTS AFFECTING MAN AND ANIMALS

Rearing of *Stomoxys*.--Craig Eagleson and Carr Smith, of the Dallas, Tex., laboratory, report rearing stable flies throughout the winter months. So far as known, this is the first successful attempt in so doing. Novel features of the method include a large stock cage, cypress larval-rearing boxes, simple breeding media, and a minimum of work.

Tobacco smoke effective in killing horn flies.--According to W. G. Bruce, Dallas, smoke generated by burning tobacco stems in a bee smoker was almost 100 percent effective in killing the horn fly (Haematobia irritans (L.)).

Bactericides as wound protectors.--Tests were made by E. W. Laake and Charles L. Smith, Dallas, to determine the value of bactericides in chemicals used for the protection of screwworm lesions in domestic animals. They report that these tests have proved phenomenal in that they have shown that the bactericidal action of a chemical is the mechanism of protection of a screwworm lesion. The mechanism of protection is apparently based on two factors--(1) the destruction of the bacteria and (2) the immediate drying and hardening of the necrotic tissues. Of 29 larvicides tested for their bactericidal properties, 7 showed good, 9 moderate-to-fair, and 13 no bactericidal properties.

Study of wound protectors in postmyiatic wounds.--E. W. Laake and Charles L. Smith have presented convincing data that the individual animal's inherent disposition and reaction to treatment and fly attack constitute a vital factor and, as such, must be taken into statistical consideration in any attempt to determine the value of wound protectors on a comparative basis. They conclude that, all other conditions being equal, a chemical applied to postmyiatic wounds will give remarkably uniform results with reference to period of protection from reinfestation and period of healing of all wounds. Also, that if considerable variations occur, such as more than a few days in the period of protection or the healing of wounds, regardless of the number of tests for any one material, these variations are due to different conditions of the wounds or the animals involved, and not to the chemical.

Feeding animals sulfur does not control lice and other pests.--O. G. Babcock, Sonora, Tex., reports that feeding a maximum of sulfur to goats and cattle over a period of 10 months failed to retard the development of biting and sucking lice, spinose ear tick, horn fly, and stable fly. Some of the animals were kept in dark stalls for 3 months, then exposed to the sunlight for the remainder of the test. The others were kept in pens in the open.

Sulfur-derris an effective dip for control of lice on range breeding cattle.--Mr. Babcock reports complete kills of the short-nosed cattle louse (Haematopinus eurysternus Nitz.) with a mixture of elemental 325-mesh sulfur, a mineral filler, and derris. Eggs were not destroyed.

Microapparatus.--Ingenious microapparatus has been perfected by C. S. Wilson, of the Beltsville, Md., laboratory, with which may be determined the presence of urease in organs as minute as the brain, heart, stomach, Malpighian tubules, and wing muscles of individual larvae and pupae of blowflies.

Maggot extract "F".--There has been a greater demand for this extract by medical cooperators than for any of the Bureau's former healing agents. William Robinson, Beltsville, states that 290 lots of this extract in 8-ounce bottles have been shipped out to 30 cooperating physicians and surgeons who are testing the extract on osteomyelitis cases in various parts of the United States. A claim for a Public Service Patent on Extract "F" is being handled through the Solicitor's Office.

Resistance of various instars of mosquito larvae to pyrethrum oil emulsions.--Conspicuous differences in resistance by larvae of different instars to pyrethrum oil emulsion were shown by W. W. Yates, of the Portland, Oreg., laboratory. For example, an application of 15 gallons per acre of water surface gave a 100-percent kill on first-instar larvae, and a 98-percent kill on second-instar larvae; whereas 25 gallons of larvicide was necessary to obtain comparative kills of third- and fourth-instar larvae. Difference in resistance by species was again observed as evidenced by 35 gallons of larvicide, necessary to obtain a comparable kill of *Culex* and *Theobaldia* larvae.

Yellow electric globe as an insect-repellent lamp.--G. H. Bradley and B. V. Travis, of the New Smyrna, Fla., laboratory, have tested a yellow electric light globe, advertised as an insect-repellent lamp, in a light trap in comparison with a standard white light. Collections over a period of 8 nights in which the globes were interchanged, gave almost identical numbers of the 3 principal pest species with the 2 lights. The total volume of other insects taken was slightly greater with the yellow light.

Larvicidal control work with organic compounds.--W. V. King and R. C. Bushland, of the Orlando, Fla., laboratory, report that changes in the hydrogen-ion concentration of the water used as a diluent had a more or less marked effect on the larvicidal action of the compound tested. It also appeared, however, that this factor was not the only one responsible for the differences in mortality that occur in slightly acid distilled water, as compared with alkaline tap and certain natural waters.

Thallium acetate and thallium sulfate as fire ant baits.--Tests with these chemicals in northern Florida by B. V. Travis show that the best results were obtained with 1-percent baits applied in bait cans. In tests with 1-percent bait for all methods of application, thallium acetate destroyed 94 percent of 70 colonies, and thallous sulfate 88 percent of 80 colonies.

Life-history data on Clear Lake gnat.--A. W. Lindquist and C. C. Deonier report from Nice, Calif., that in the spring and early summer the larvae of *Chaoborus* were found to be more abundant in the upper 4 inches of bottom mud than during the fall and winter. During the fall, 61 percent of the larvae were in this layer, during March 84 percent, and during April to June 93 percent. It was also indicated that during May larvae in the lake required 18 days from egg to fourth instar.

Protection from fleeceworm and cutaneous myiasis infestations.--In preliminary tests E. F. Knipling, of the Menard, Tex., laboratory, reports that benzol containing 15 percent diphenylamine, diphenylene oxide, or p-nitrophenetole, has proved effective as a treatment for fleeceworm or cutaneous myiasis infestations caused by *Phormia regina* Meig. and *Cochliomyia macellaria* Fab.

FOREIGN PLANT QUARANTINES

Rice stem borer in lily hamper.--While examining hampers of lily bulbs from Japan during May a New Orleans inspector noted that ends of some of the rice straws had been sealed. Examination revealed a live larva of Chilo simplex (Butler).

Psychology again stops fruitfly.--A second-class passenger from Puerto Rico was met at the New York pier on June 17 by his son. The son opened his father's baggage for the inspector while the father persistently kept behind the inspector. Following up this tip that the father had something to conceal the inspector found 13 mangoes on his person, 1 of them containing 3 live larvae of Anastrepha sp.

Customs help appreciated.--On June 17 Wilmon Newell, plant commissioner of the State Plant Board of Florida, took occasion to express to Oscar Lounders, customs inspector stationed at Miami, Fla., his appreciation for customs personnel help in enforcing the Federal plant quarantines. The particular case in point was the finding of sweet-lime leaves hidden in the baggage of a passenger from Cuba. Upon examination, it was found that these leaves were heavily infested with the citrus blackfly, a destructive pest of citrus and other plants. This is merely one illustration of the type of cooperation which is and has been accorded by representatives of the Customs Bureau and the Post Office Department.

Entomological interceptions of interest.--Eight dead larvae of the Mexican fruitfly (Anastrepha ludens (Loew)) were found on June 9 in a mango in baggage at Del Rio, Tex., from Mexico. When the sack containing the mangoes was examined a living adult of A. ludens came out and was caught in the office on the window screen. A living larva of a lycaenid, identified as probably Cosmolyce boeticus (L.) was taken at New York on June 19 in green peas in stores from Portugal. Specimens of the curculionid Pachnaeus litus (Germ.) were found in a pineapple crate in cargo at Port Everglades, Fla., on May 25 from Cuba. Living larvae, pupae, and adults of the scolytid Myelophilus minor Htg. were taken at New York in pine wood used as packing for peat moss in cargo on June 13 from Holland. One living adult of the cerambycid Anoplodera crassipes Lec. was intercepted at Blaine, Wash., on June 10 on rose cuttings in cargo from England. Living adults of the bruchid Callosobruchus analis (F.) were found at Savannah, Ga., on May 27 in chickpeas in cargo from India. This bruchid is recorded by Maxwell Lefroy in "Indian Insect Life," 1909, as breeding in cowpeas in India. So far as is known, it does not occur in the United States. One living adult of the lygaeid Ischnorhynchus ericae Horv. was found at Mobile, Ala., on June 6, on cabbage in stores from Italy. The coccid Asterolecanium stentae Brain was taken on Euphorbia sp. in mail at Washington, D. C., on May 8 from the Union of South Africa. A living adult of the lygaeid Sisamnes contractus Dist. was intercepted at Laredo, Tex., on May 23, on pineapple in cargo from Mexico. One living adult of the ostomid Temnochila metallica Perch. was taken on pineapple at Brownsville, Tex., in cargo on June 15, from Mexico.

Pathological interceptions of interest.--Determinations received during the month included additional or belated determinations for several interceptions made in previous years but of interest because new to our interceptions files. Unless otherwise specified the interceptions were made at

New York. Determinations received included Apiosporella rhodophila Sacc. on manetti rose stocks from Ireland on January 1; Ascochyta buxina Sacc. on Buxus sempervirens from Germany on June 2, 1938; A. fabae Speg. on Vicia faba from France on May 9, 1938; Coryneum microstictum Berk. on manetti rose stocks from Ireland on January 29; Elsinoe australis Bitancourt & Jenkins on sweet orange from Brazil on March 24; Epicoccum nigrum Link on bell peppers from Mexico in May at Nogales; Fusicoccum microspermum Has. & Karst. form catappae Frag. & Cif. on green fruit of Terminalia catappa from Puerto Rico on January 1; Mycosphaerella citrullina (C. O. Smith) Gross. was intercepted from February to June, inclusive, on cucurbits from Cuba, hosts including chayote, cucumber, Momordica charantia, and crook-necked and hairy squashes, part of the determinations being verified by J. W. Wiant, of the Bureau of Plant Industry, by culturing; Peronospora pisi (deB.) Syd. on peas from Portugal on June 19; Pestalozzia compta Sacc. on manetti rose stocks from Ireland on January 29; Phragmidium rubi (Pers.) Wint. on Rubus sp. from France on October 28, 1936; Pleospora juglandis E. & E. on walnut scions from Poland on January 23, 1937; Septoria pisi West on peas from Portugal on June 19; Verticillium buxi Link on Buxus sempervirens from Germany on March 27, 1937.

DOMESTIC PLANT QUARANTINES

Plant-inspection work in District reorganized.--The Division of Domestic Plant Quarantines has recently taken over the work of inspecting plant shipments coming into Washington, D. C., to determine whether such shipments meet the plant-shipping regulations of the District of Columbia. This work will be conducted in connection with transit-inspection activities carried on by that Division for the enforcement of Domestic Plant Quarantines. Inspectors of the Division of Foreign Plant Quarantines will continue to inspect and certify plants to be shipped out of the District.

Grasshopper development.--Some flights of the lesser migratory hopper occurred in June in three counties of the contiguous area of Texas, Oklahoma, and Colorado and migrations also took place into adjacent counties of Kansas. The hatch of the lesser migratory hopper was completed in the infested areas of most of the States early in June and some adults were present in all States by the close of June. In many areas of the northern Great Plains States the cool weather continued in June and prolonged the hatch. In Maricopa County, Ariz., it has been reported that eggs laid in May hatched in June. Melanoplus mexicanus Sauss. appears to be the dominant species in almost all areas of North Dakota and Montana and in five counties of the Panhandles of Oklahoma and Texas. The heavy infestation of this species in north-central Montana this season constitutes a newly infested area, so far as extensive outbreaks are concerned, and is accounted for by reason of the heavy outbreak last year in eastern Montana and in western North Dakota and South Dakota, and the prolonged migrations in the general direction of this newly infested area. In northwestern Minnesota and contiguous area in North Dakota, M. mexicanus, M. bivittatus (Say), and M. packardii Scudd. developed beyond expectations because of dry weather and reached threatening proportions. The crop outlook in this area is poor. Infestations of M. mexicanus reported from six Colorado counties were reduced considerably by birds and weather conditions. M. bivittatus was the dominant species, with few exceptions, throughout South Dakota, northwestern Minnesota, northeastern Nebraska, and northeastern New Mexico. The development was similar to that of

M. mexicanus. Aeoloplus turnbullii (Thos.) was dominant in southwestern Nebraska and western Kansas and made localized flights from idle and range land into wheat fields in Trego County, Kans., late in June. M. devastator Scudd. remained the dominant species in California.

Grasshopper damage is light.--Crop damage thus far (July 1) in the region comprised by the 24 infested States has, as a whole, been light. Heavy vegetation along roadsides and in pasture lands afforded an abundant food supply. Drought in several States in June, however, caused increased migrations into crop areas.

Grasshopper outbreak in northern Montana controlled.--Most intensive baiting activities were conducted in June in the several counties of north-central Montana where infestations of the lesser migratory hopper seriously threatened the crops. Activity by farmers, combined with Bureau-paid labor, was responsible for reducing crop losses to not over 5 percent and preventing large-scale migrations. One hundred and seventy-two Government spreader units and 400 laborers were put to work. The peak of the infestation had passed by June 19. Grasshoppers were reduced from 500 to 10 per square yard in some areas. The farmers' attitude in this area has been highly favorable toward the bait-spreading program, and their cooperation nearly 100 percent. Across the line into Saskatchewan there lies an area of 2,400 square miles which is heavily infested with M. mexicanus. Some baiting is being done but a large part of the crop has been destroyed. On June 24 a few adult hoppers were observed milling in the air. This infestation, it is believed, has resulted from the 1939 flights out of eastern Montana and western North Dakota.

Infestations in eastern Montana and western North Dakota.--Populations of hoppers in this area have increased slightly but no damaging outbreaks have been reported. The situation on June 22 was described as "light to threatening, with spotty severe infestations and little damage to crops." In the strip-cropped areas, the idle strips were plowed or double disked. Most of such work was done by June 15 and nymphs of the first to third instars in these idle strips were almost completely eradicated.

Voluntary control in hopper areas.--Farmers and ranchers in parts of Montana, North Dakota, Minnesota, Arizona, and California made every effort to combat grasshoppers and the results they obtained were excellent. In the crop-hopper areas control was less effective. Heavy rains early in the season prevented extensive hopper damage and farmers were not inclined to bait until crop injury was apparent, in the hope that crops would mature and be harvested before being injured.

Bureau-paid control work in grasshopper areas.--Bureau-paid grasshopper-control operations have been carried on in the current season in the two regions--the Northern Great Plains and the Southern Great Plains--where infestations of the migratory species, combined with large areas of idle and range land, produced a situation with which the farmers in the lightly populated areas were unable to cope. To June 29, more than 1 million acres of infested lands, including roadsides, had been baited, in Bureau-paid operations, in Montana, North Dakota, South Dakota, Colorado, Oklahoma, New Mexico, and Texas. The results have proved satisfactory in almost every instance. The average kill has been high. Two airplanes were brought into use for spreading bait in Baca County, Colo., four in Dallam County, Tex. By the close of June populations of the long-winged migratory hoppers in Colorado and New Mexico were so reduced that baiting was no longer justified and the work was discontinued.

Progress in Mormon cricket control.--Mormon cricket control work is well advanced and it seems apparent that crop protection will be almost complete in all areas. The operations were well organized in advance of the season and cricket bands were intercepted before they could invade the crops. Some migrations from higher elevations to crop lands took place, however, in western Idaho and Nevada. In Big Horn and Yellowstone Counties, Mont., where infestations were severe in former years, the large bands of crickets in the higher elevations fed on the abundant succulent native vegetation and few migrations to crop areas occurred. Half a million pounds of mixed dust has been spread this season on infested areas in Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming. In addition to these dusting operations, baiting with sodium fluosilicate was conducted in three counties in Oregon and in experimental areas in Idaho, Montana, Wyoming, and South Dakota, with excellent results. In Jefferson County, Idaho, farmers in 1 week assisted in spreading more than 3,000 pounds of such bait to protect crops from a 6-mile-wide band of migrating crickets. Operations are conducted jointly with the States. Crews from C. C. C. camps of various Federal agencies, and laborers from the Indian Service have given substantial assistance.

Mormon cricket development.--Crickets reached adulthood in June in most of the infested States. In the higher elevations of two Wyoming counties cricket eggs had not yet hatched at the close of June. Two species of hymenopterous parasites were found to be infesting a rather high percentage of Mormon cricket eggs in that locality.

Baiting Mormon crickets proves highly successful.--The results of rather extensive tests in the use of fluosilicate bait for killing Mormon crickets have indicated that the use of bait from the fourth instar onward is probably more economical and satisfactory, particularly in areas other than cultivated fields, than is power dusting, although the latter method has proved effective in the control campaigns against this pest. In Madison County, Idaho, 160-200 acres was baited by hand by three men in approximately 3 hours and a kill of almost 100 percent was obtained. These results were brought about by strip-baiting in a half circle, applying the first strip of bait just within the vanguard of the band of migrating crickets. Very few crickets migrated beyond the baited strips. Hand-baiting in some instances has enabled two men to control crickets on acreage which would require the use of two power dusters. The results have been so good that this practice has been generally adopted on the work in Idaho this season. With crickets in the early instars, however, it is believed that it will be necessary to continue dusting when the weather is unsuited for baiting.

Peach-tree inspection.--Throughout the month of June cooperative Federal-State inspections have continued in the mosaic-infected States of Arizona, California, Colorado, New Mexico, Oklahoma, Texas, and Utah, and in the phony-infected States of Tennessee, Texas, Georgia, Arkansas, Alabama, Mississippi, Louisiana, Kentucky, Illinois, North Carolina, and South Carolina. Practically all inspections for the phony peach disease were concentrated on the nursery areas. Many previously infected properties and those adjacent thereto were also inspected at the time of the regular nursery inspection. Such phony-peach-inspection work was completed by June 30 in all nurseries and their environs, with 2 Georgia nurseries involving approximately 6,000 peach nursery trees, and 1 Texas nursery involving 5,000 peach trees, failing to meet the phony peach certification requirements. In the results of the mosaic inspections, it is necessary to supplement the item on peach-tree inspection in the July 1, 1940, News Letter (v. VII, No. 7, pp. 27-28), with the statement that 2 nurseries in New Mexico, as well as several small nurseries in Colorado producing stock for home use only, failed to meet the certification requirements of the standard State quarantines.

Progress in chinch bug control.--At a conference, attended by B. M. Gaddis and C. M. Packard, on the chinch bug situation held at Chicago on June 16 with State leaders of four heaviest infested States, orders were placed for the required quantities of creosote, of which 100 cars were rolling the next day. Throughout the month all requests for creosote were filled as rapidly as received. The facilities provided were capable of placing, loading, billing, and rolling a million gallons on the day the orders were received. To the close of June, there were shipped to Illinois, Iowa, Kansas, Missouri, and Nebraska 905,000 gallons of barrier oil. Federal scouts continued to make surveys in cooperation with the affected States and kept the Washington and Chicago offices informed of the current situation. Spotted heavy rains over most of the heavily infested area during the last week in June somewhat reduced the seriousness of the problem. However, in the area comprised of northwestern Missouri, southwestern Iowa, and northeastern Kansas the rains were not sufficient to materially reduce chinch bug development in the most heavily infested sections. The situation remained serious and general migrations were expected to continue in the early part of July.

New infestations of white-fringed beetle.--New infestations of the white-fringed beetle were found in June in the vicinity of Mobile, Ala., New Orleans and Baton Rouge, La., and Laurel, Miss. These properties are, however, in the general location of areas formerly known to be infested. The infestation at Mobile, found on both banks of Three-Mile Creek, adds over 200 acres to the known infested area. Few beetles have been found, however on the old infested area in the vicinity of Mobile, where intensive eradication measures have been carried on for several months. At Laurel, Miss., three adult beetles were picked up on the highway in a new locality and highway inspection south of the New Orleans control area was also the means of locating two of the four new infestations there. At Baton Rouge one beetle was picked up on a property adjoining a formerly infested nursery. Immediate suppressive action is being taken in all these infested localities. In the Mobile area as many as six applications of herbicide and three of calcium arsenate spray have been made, while in the old infested area localities suspected of harboring any beetle eggs are burned.

White-fringed beetle control.--Throughout the infested areas the work of disking and fallowing the fields went forward, and dusts and sprays were applied again and again on the known infested properties, in some instances as many as 10 times. W. P. A. laborers are employed on the work. Night dusting is proving satisfactory in certain Alabama areas. It is found that more work can be accomplished under this schedule with the limited power-dusting equipment available. Frequent heavy rains throughout the infested areas of the various States have greatly retarded the control work. Repeated applications of dust have been made between rains, however, and equipment, materials, and personnel are in readiness for further broadscale operations. The work is being carried forward jointly with the affected States. With the resumption of seasonal quarantine restrictions there has been increased activity in regulatory work and increased movement of scrap metal is reported.

Wild-host plants of sweetpotato weevil inspected.--In June inspectors on the Federal-State cooperative sweetpotato weevil control and eradication project conducted rather extensive inspections of wild-host plants, principally the "Indian potato," on infested properties or those adjacent thereto in the States of Alabama, Georgia, Mississippi, and Texas. The results were negative, except for the finding of 1 dead weevil 50 yards from a formerly infested storage bank. Traps operated during the month caught 1 weevil in Baldwin County, Ala., but none in the areas in Georgia in which the traps were set. Control, eradication, and regulatory work was conducted during the month. In Mississippi inspection and other activities went forward in 12 counties. In Texas the work was centered on the buffer area, and all plant beds in a 5-mile strip across the southern part of Nacogdoches County, bordering the area from which weevils have recently been eradicated, were inspected without finding any of these pests.

New regional district in transit inspection.--N. H. Dunlap has been placed in charge of transit inspection in the southern region of the United States, with headquarters at Washington, D. C. This newly formed region includes the transit-inspection stations of Atlanta, Birmingham, Memphis, and Dallas, and cooperative Federal-State inspection at Jacksonville. Inspection at Washington is also being conducted under this set-up for enforcement of plant shipping regulations of the District of Columbia, insofar as such inspection applies to incoming shipments. Transit-inspection activities were temporarily suspended at Birmingham on June 25, at Memphis on June 15, and at Dallas on April 15. These three stations have proved to be important as inspection points for the enforcement of Federal domestic plant quarantines.

Fruits, vegetables, and cut flowers inspected in transit.--Transit-inspection activities throughout the various regions, including those of the Central States, are given over largely to the enforcement of the Japanese beetle quarantine regulations, through the inspection of fruits, vegetables, and cut flowers shipped from the area heavily infested with the beetles and checking the screening of such produce in transit. Farm produce from the white-fringed beetle regulated areas is also being inspected at Chicago and other transit-inspection points.

Air shipments inspected.--Two plant shipments from the gypsy moth area which had been consigned by air without moth certificates were caught by transit inspectors in June. One containing cedar cuttings in a bouquet of cut flowers was intercepted at Boston and the other containing field-grown cut roses was caught at Pittsburgh. With the opening of a new airport at Philadelphia on June 20, a survey of the daily movement of planes was made by a transit inspector who reports there are 80 arrivals and departures daily. In New York City the inspection of air express, which since last October has been limited, was resumed on a larger scale in June, in order to effect a more complete coverage of cut-flower consignments.

Inspection of citrus in the lower Rio Grande Valley.--At a recent conference with Texas State plant-pest-control officials, it was the decision to transfer tree-removal work under the citrus canker project from the Houston area to the commercial area in the lower Rio Grande Valley. Work in the former section has progressed to a point where few large *Citrus trifoliata* trees remain therein. In the valley area during May and June over 17,000 old and abandoned citrus trees were removed with the assistance of 58 W. P. A. laborers. A county-owned tractor has been loaned to help in pulling out large plantings of citrus trees in this district. One hundred and thirty properties, including several on which canker had been found many years ago, were inspected without finding the disease. From 5 to 7 Bureau inspectors and 1 State man made the inspection. No citrus canker has been found in the lower Rio Grande Valley in the last 18 years.

CONTROL INVESTIGATIONS

Effects of poison administration on blood cells of southern armyworm.--At the Beltsville, Md., laboratory, J. Franklin Yeager and Sam C. Munson have studied the effects upon blood cells of *Prodenia eridania* Cram. of feeding large doses of a number of poisons to sixth-instar larvae. Nicotine bentonite, nicotine peat, rotenone, pyrethrum, and phenothiazine produced no marked changes, but marked changes in the blood cells did follow the administration of calcium arsenite, calcium arsenate, arsenic trioxide, paris green, lead arsenate, sodium fluoride, sodium fluoaluminate, barium fluosilicate, and mercuric chloride. The cells appeared unaffected upon prolonged (6 hours) exposure of the larvae at room temperature to air saturated with nicotine vapor. The larvae were fed the poisons after having been fed glucose to increase blood-cell glycogen and after having been ligatured in such a way that the fore ends only would be affected by ingested poisons and the hind ends could be used as controls. The arsenicals, the fluorides, and mercuric chloride caused blood cell changes of both a physiological and a degenerative or toxicological nature. The physiological changes consisted of alterations of cellular form (passive-active transformations) and an increase of cellular agglutination *in vivo*. The degenerative changes consisted of marked cellular agglutination, cellular distortion, cellular disintegration, and apparent loss of cells from the circulating blood. Cellular degeneration involved apparent swelling, disruption, and decrease in visibility of cytoplasmic structure, decreased staining ability, decrease and loss of cellular glycogen, formation of cytoplasmic bulges, formation of and liberation of cytoplasmic plastids, excessive vacuolization, cellular raggedness, nuclear distortion, nuclear fragmentation, nuclear condensation, and occasionally nuclear extrusion.

INSECTICIDE INVESTIGATIONS

A new method for quantitative determination of pyrethrins.--A method has been developed by F. B. LaForge and F. Acree, Jr., for the determination of pyrethrins I and II, based on the previously observed property of the pyrethrins to undergo cleavage on hydrogenation with formation of dihydro chrysanthemum monocarboxylic acid and chrysanthemum dicarboxylic acid monomethyl ester, a reaction that has since proved to be quantitative and specific. The acid reaction products are separated by steam distillation, the one being volatile (and stable), the other practically nonvolatile. The pyrethrins are calculated from the respective titration values. The process involves the hydrogenation in ethanol or acetone solution of pyrethrum concentrates, oleoresins, or extracts of flowers, precipitation of fatty acids by aqueous barium hydroxide, filtration, acidification of filtrate, separation of acids by steam distillation, direct titration of distillate and titration of nonvolatile acids after extraction with ether or other solvent. The method has been tested on a number of samples with very precise results. As compared with other standard methods, the values obtained are slightly higher. The hydrogenation method has the decided advantage over others in that the results for both pyrethrins are obtained in about 1 hour, exclusive of the extraction process where the determination is made on flowers or powders. A detailed publication will follow shortly.

An analytical method for determining nitrogen.--In practically all cases of chemical investigation the final solution of a problem resolves itself into one of analytical procedure. In other words, the purity, composition, or nature of a substance must be determined by analysis. One element which must frequently be determined is nitrogen. There are many ways this may be done and there is also much misunderstanding as to the simplest and best way of doing it. E. P. Clark, in collaboration with the Association of the Official Agricultural Chemists, has made an exhaustive study of this problem and has developed a simple, rapid, and extremely accurate procedure for the determination of nitrogen in practically all types of nitrogenous compounds. This method is to be presented to the A.O.A.C. at their annual meeting in the fall and it is almost certain that it will be adopted as official by that body. The method will thus have a legal as well as a scientific status.

Phenothiazine interference case.--On April 29, 1940, the United States Court of Customs and Patent Appeals reversed the decision of the Board of Appeals of the United States Patent Office in Interference No. 71,407, Floyd E. Smith, appellant, of the Division of Insecticide Investigations, vs. Euclid W. Bousquet, appellee of E. I. du Pont de Nemours & Co., and thus awarded priority of invention in the matter of the use of phenothiazine as an insecticide to Mr. Smith. Mr. Smith filed an application for a patent on the use of phenothiazine as an insecticide on June 9, 1934, and Bousquet filed a similar application on July 26, 1934. The Examiner of Interferences and the Board of Appeals of the Patent Office both awarded priority to Bousquet. The Office of the Solicitor on July 16, 1940, advised this Bureau that the United States Court of Customs and Patent Appeals on June 21, 1940, denied the petition of appellee Bousquet for rehearing in Patent Interference 71,407. The decision of the United States Court of Customs and Patent Appeals, the final tribunal in patent interference cases, is of interest to workers with insecticides because, in the opinion of this Court, an invention concerning the insecticidal use of any material is not reduced to practice until it has been tested under conditions under which the insect is naturally found.

BEE CULTURE

Parasites help preserve pollen samples.--Frank E. Todd, Davis, Calif., reports: "Pollen samples, waiting to be or stored in the laboratory have been seriously infested by the Indian-meal moth (Plodia interpunctella Hbn.) and have required constant attention. During the adjustment period, owing to changes in regulations concerning the hiring of temporary help, pollen samples were left exposed for longer periods before storage. Notwithstanding this, adult meal moths rather suddenly practically disappeared, and in their stead numerous parasitic Hymenoptera (not yet identified but similar in appearance to descriptions of Microbracon hebetor Say) appeared. Needless to say, this assistance is very much appreciated."

Variations in the technique of artificial insemination of queen bees.--Otto Mackensen, University, La., reports the use of transmitted light to determine the comparative number of spermatozoa in spermathecae of queens inseminated by various methods. In these comparisons the spermathecae transmitting the least light are considered to contain the most spermatozoa. Some preliminary results are as follows: The greater the volume of sperm injected at a single operation, up to the capacity of the queen's oviducts, the more spermatozoa reach the spermatheca. When the vagina was filled with the mucus secretion of the drone, after the sperm was injected, distinctly better results were obtained than when no mucus was used. A smear of mucus over the opening of the vagina was less effective. When the sperm was taken from the seminal vesicles of the drone slightly better results were obtained than when the drone was ejaculated and the sperm taken from the everted penis. Drones which had been kept in a constant temperature cabinet at low humidity from the time they emerged until used were found to be as satisfactory as drones returning from flight.

Queens shipped by mail start egg laying later than those shipped in standard packages.--C. L. Farrar, Madison, Wis., reports that of 139 queens 42.44 percent required from 2 to 6 days to begin egg laying. These were a part of 267 queens received by mail and introduced into queenless packages. The time of observation did not permit an estimate of the initial egg laying for 98 queens. Two were virgin queens, 27 were lost at introduction, and 1 was dead before introduction. Out of the 139 queens, approximately 21 percent required 2 days to begin laying; 10 percent, 3 days; 2 percent, 4 days; 3 percent, 5 days; and 6 percent, 6 days. More than 95 percent of the queens in standard packages introduced by the spray and direct-release method during the last 3 seasons began laying in less than 1 day, averaging 12 to 18 hours. The delayed egg laying of queens shipped by mail for use in packages coincides closely with that when queens shipped by mail have been sprayed directly into established colonies. Introduction losses are higher and more time is required for the queens to lay. Delayed egg laying may be directly responsible for the loss of some queens. It may be assumed that queens shipped by mail are not properly fed by the small number of attendant worker bees to keep their reproductive organs in active condition. In standard packages, from 7,000 to 10,000 worker bees which have been feeding brood are available to provide the queen with royal jelly. As approximately 22 percent of this year's queens began laying in less than 1 day, it may also be assumed that some of the attendant bees were in better condition to feed these queens. Some experimental evidence has indicated that queens held in mailing cages, provisioned with candy containing pollen, began laying sooner than in those lacking pollen. Worker bees require pollen in order to secrete royal jelly.

Cooperative investigation on losses of adult bees in Utah.--In Utah the severe losses of adult bees that have occurred in recent years have been ascribed to various causes, such as insecticidal spraying and dusting operations, grasshopper-control methods, and the effect of smelter fumes.

Consequently field work was started this spring on a cooperative project, between the Bureau of Entomology and Plant Quarantine and the Utah Agricultural Experiment Station, to investigate the extent and causes of losses of adult honeybees in the State of Utah and other sections of the country where insect-control programs are in progress. This project is under the direction of A. P. Sturtevant, Laramie, Wyo. Work in the field is being done by John D. Hitchcock, of the same laboratory, and Geo. H. Vansell, of Davis, Calif., working in cooperation with Geo. F. Knowlton, research associate professor of entomology of the Utah Agricultural Experiment Station and State leader of grasshopper and mormon cricket control. Samples of bees from affected areas are being collected and sent to the Laramie, Wyo., laboratory for arsenical analyses and examinations for intestinal parasites. The attractiveness to bees of grasshopper baits of various kinds is being tested and the possible role of poisonous plants is also being investigated. Dr. Sturtevant reports that in the work thus far, "With the exception of possibly two apiaries, no serious losses of bees have been observed this summer up to the end of June, although a number of beekeepers feel that the death rate is already excessive in their yards, and are alert to notice dead bees in front of their hives. Samples of bees from one of the above-mentioned exceptions were found to contain from 0.00027 to 0.00030 mg. of As_2O_3 per bee, while the other showed only 0.00016 mg. per bee, not large amounts. The results from 82 samples of bees that so far have been analyzed at the Laramie laboratory may be summarized as follows: 41 samples of apparently normal bees concerning which there was no particular suspicion averaged 0.00012 mg. of As_2O_3 per bee, ranging between 0.00004 and 0.00020 mg. per bee, with the exception of 1 showing 0.00026 and another 0.00032 mg. per bee; 33 samples from places where there were presumably heavy losses last year, or where bees have been dying this year with more or less suspicion of possible contact with poison, averaged 0.00024 mg. of As_2O_3 per bee, ranging from 0.00008 to 0.00039 mg. per bee. Eight samples of bees have been analyzed taken from experimental colonies at the Experiment Station at Logan, where grasshopper bait experiments have been carried on, showing 7 samples ranging between 0.00010 and 0.00026 mg. of As_2O_3, and one which showed 0.00073 mg. As_2O_3 per bee, the highest amount that has been found in any sample so far. The exact history of this sample is not known at this writing. Five samples of pollen have been analyzed, 1 taken from combs in an apiary showing no arsenic, and 4 taken from pollen traps ranging from 0.00004 to 0.00011 mg. of As_2O_3 per gram of pollen. Samples of normal bees from colonies at Laramie ranged between 0.00001 and 0.00004 mg. of As_2O_3 per bee, much lower than the apparently normal bees from Utah, only 4 out of the 41 samples showing as low as 0.00004 mg. per bee. Up to the present it is felt that no significant results have been obtained. The difference between apparently normal bees and those for which there might be a possible but not very definite suspicion is hardly sufficient to be important, with the variations within these groups so great. No evidence of intestinal parasites has been found. Two samples of Astragalus utahensis and two of Astragalus cibarius (Sheldon) common in the neighborhood of some of the beekeeping areas being investigated have been analyzed for the presence of selenium by the Chemistry Department of the Wyoming Agricultural Experiment Station and no selenium has been found."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Receipt of Chilean earwig injurious to potato.--Among the insects recently collected in Chile by P. A. Berry, of the Division of Foreign Parasite Introduction, are two specimens of Esphalmenus lativentris (Philippi). These earwigs were found at Castro, Chile, feeding on the surface of a tuber in a potato-storage warehouse. They are the first specimens of the genus Esphalmenus to be received for the National Museum collections. Species of Esphalmenus are wingless and resemble somewhat the common genus Euborellia, though the two genera belong to different subfamilies. There are several species, all of which occur in the Andean and extreme southern regions of South America, except one which lives in South Africa. Chile is well known as the home of many insects, as well as of plants, which have few close relatives elsewhere in America, and many of which show affinities with Australian, New Zealand, or South African species. A case parallel to the present one is that of an orthopteran, Cylindroryctes spegazzinii (G.-T.), described from the sandy shores of Lake Nahuel Haupi near the Chile-Argentine boundary. In 1927 R. C. Shannon obtained specimens of this peculiar insect, which he gave to the National Museum, near the type locality. The species looks like a very elongate mole cricket, and according to farmers of that region it often causes injury to potatoes and other vegetables. The only close relatives of Cylindroryctes are species of Cylindracheta, which inhabit Australia, New Guinea, and other islands of the Australasian region.

Valuable series of psocids collected in peach-insect survey.--During the last 3 years and more, L. D. Christenson, W. F. Turner, and their co-workers engaged in a survey of insects found in peach orchards have submitted many psocids of unusual interest. Only one thoroughly modern revisionary paper has been published in the United States on the Corrodentia, and the opportunities to contribute important distribution records and discover rare or new species are good. Many species live among dead leaves and other ground litter, so that the methods employed by the peach-insect collectors in examining the surface cover of orchards have been fruitful. Material in the genus Lachesilla, which genus contains the cosmopolitan L. pedicularia (L.), often intercepted in commerce, has been especially well represented among the collections received and it is hoped that revisionary studies will eventually be made.

Correction of record concerning a Chinese scale insect.--The infestation of a new scale insect, Parlatoria chinensis Marlatt, reported in the News Letter dated June 1, 1940 (v. VII, No. 6, p. 35), as having been found at Glendale, Mo., occurred instead near Tower Grove Park, in the central part of St. Louis.

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FOR JULY 1940

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FRUIT INSECT INVESTIGATIONS

Second brood of curculio in Georgia light.--Oliver I. Snapp, of the Fort Valley, Ga., laboratory, reports that this is the first year since 1923 that the Elberta peach crop in Georgia was not subjected to at least a partial second-brood plum curculio attack. The Elberta is the last commercial variety of peach to ripen in Georgia and therefore the entire crop of Georgia peaches was harvested this year before the deposition of second-generation plum curculio eggs. Second-generation eggs began to form in the bodies of new plum curculio females on July 5, but it was July 26 before any of these eggs matured. The Elberta peach harvest was completed on July 25. The first mature eggs of the second generation were found in the body of a female that emerged from the soil on June 20; therefore the period between adult emergence and the maturity of the first eggs of the second generation was 36 days.

Location of Charlottesville, Va., laboratory.--The new laboratory at Charlottesville, Va., for the study of Comstock's mealybug on apple, is located on Rio Road (Park Street extended) 2 miles from the Courthouse, north. The telephone is Charlottesville 1345-L, and the post office address is Box 171, Charlottesville.

Use of rotary net to obtain flight records of codling moth.--Records of codling moth population in apple orchards have been obtained for some years by means of molasses baits, reports the Yakima, Wash., laboratory. Evidence accumulated, however, that these records did not always give a true picture of the population. A power-driven rotary net has therefore been set up in an apple orchard near Yakima, to obtain records in a different manner. Two nets are in operation, 1 about 10 or 12 feet above the ground and the other near the tops of the trees, swinging as close as possible to 2 adjacent trees. These nets are both on 1 shaft and constructed in much the same manner as nets used at other laboratories (see Jour. Econ. Ent. 32:859, 1939). The cost of constructing the net, exclusive of labor and the motor and gears, which were on hand, was about $20. It cost an additional $10 to have the proper electrical connections made, and the cost of operation, with the net running 12 to 14 hours per night, is about $4 per month. During the first 30 days of operation, the lower net caught about 1,900 codling moths (very few moths have been caught in the upper net). Two molasses baits, placed in trees about 200 feet away, in opposite directions, have caught about 1,600 and 1,800 moths, respectively; hence the net catches enough codling moths to give a very good idea of the daily fluctuation in moth flight. It is too early to make any statement as to the relative value of the net and of baits for sampling the codling moth population, but it is interesting to note that a single net, rotating past a small portion of 2 trees, is catching more moths than a single, presumably attractive, bait placed in a tree in the same orchard.

Winter survival of raisin moth.--Winter surveys, by D. K. Barnes, C. K. Fisher, and G. H. Kaloostian, of the Fresno, Calif., office, were made in two vineyards in Tulare County during January and February of 1939 and 1940 for the purpose of determining the size of the overwintering larval population of raisin moth. Trapping with malt-sirup bait traps to determine the size of spring emergence followed these surveys. The overwintering larval populations found in 1940 were smaller by 89.4 percent than in 1939. The number of moths taken per trap per day in 1940 showed a reduction of 68 percent, as compared with the number for 1939. A larger percentage of larvae must have survived the winter in 1940 than in 1939. Reduction in the percentage of parasitization was an important factor in the survival. The parasitization among over-wintering larvae was 10.7 percent in 1939 and 3.4 percent in 1940. The most abundant parasite found was Idechthis canescens (Grav.).

MEXICAN FRUITFLY CONTROL

Fruitfly populations decreasing.--In June 1,126 fruitflies were trapped in the regulated area but in July only 229 flies were taken. Most of these were from groves in the western end of the valley, and 108 came from 1 district. Almost all of the flies trapped in this 1 district came from 2 properties which had been heavily infested in the late spring. The trend of the fruitfly population appears to be following that of previous seasons, and it is expected that a low point in the population will be reached in the very near future. Heavy rains early in July materially benefited the rapidly maturing fruit crop and, although the indicated production is somewhat short of last season's, it is expected that the increased size in the fruit will go a long way toward making up the forecasted shortage. Insect damage to the new crop appeared to be limited to a rather heavy infestation of rust mite and a very light infestation of scale.

CEREAL AND FORAGE INSECT INVESTIGATIONS

A second introduced parasite of vetch weevil recovered.--J. S. Pinckney, Carlisle, Pa., reports that during the latter part of May and the first part of June, 7,249 adults of Triaspis thoracicus Curt., a parasite of the vetch weevil, were liberated on a patch of vetch at the Piedmont Experiment Station at Statesville, N. C. Of this number of parasites, 3,901 were males and 3,348 were females. On July 10 a fairly large number of pods were collected from this release area and placed in rearing boxes for issuance of any parasites that might be present in the infested seed. Since July 15 and to date, 55 adults of T. thoracicus have been reared from this material. This is the first time that recovery in numbers has been made of this parasite from areas of release. Once before, at Arendtsville, Pa., 1 adult of this species was reared from pods collected at a point where approximately 10,000 Triaspis had been released. At about the same time that these releases of Triaspis were made at Statesville similar releases were made at Salisbury, N. C., except that they were all made in June, as the vetch crop there was later than at Statesville. A total of 5,929 adults of T. thoracicus were released, of which 2,567 were males and 3,362 were females. No recoveries have as yet been made from the collection of pods gathered at this point on July 10 and which were brought into the laboratory for rearing. The recovery of an introduced parasite referred to as Tetrastichus sp., liberated in North Carolina last year, has already been recorded.

New distribution record for vetch bruchid.--J. S. Pinckney, Carlisle, reports the following new distribution points for Bruchus brachialis Fahr.: Goodyear, Mechanicsburg, and Carlisle, Cumberland County, Pa., and Martinsville, Henry County, Va.

JAPANESE BEETLE CONTROL

Japanese beetle trapping.--During July trapping continued in 14 States and traps were operated by Bureau workers at most of the field stations scattered about the United States. In the regular trapping program 800 traps were in operation in Athens, Chamblee, Gainesville, and Toccoa, Ga.; 13,069 traps in Chicago, Ill., and its suburbs; and 9,000 traps in 21 cities and towns in Indiana, ranging from 100 traps in Franklin, Noblesville, Portland, and Winchester to 1,200 in South Bend and 2,700 in Indianapolis. In Kentucky there were 1,400 traps--200 in Frankfort and 1,200 in Louisville. Fifteen Maine communities were trapped with a total of 1,400 traps, while in Michigan 6,900 traps were operated in Detroit and its suburbs. Three hundred traps were operated in 4 cities in New Hampshire, and in New York 1,800 traps were in operation in Auburn, Batavia, Canandaigua, Geneva, Newark, and Dansville, all in or near the Finger Lakes section. In North Carolina 7,455 traps were set in 22 cities stretching from Elizabeth City on the Atlantic coast to Asheville near the foot of the Great Smoky Mountains. In Ohio there were 5,200 traps in 17 cities, from Conneaut and Elyria near Lake Erie on the the north to Gallipolis and Marietta on the Ohio River in the south, plus 1,500 traps on 3 scattered routes. Seven hundred traps were placed in 3 northwestern Pennsvylania cities, and 1,100 traps were distributed in Florence and Greenville, S. C. In Berryville, Danville, Front Royal, Harrisonburg, Petersburg, and Winchester, Va., 1,200 traps were operated, with an added 600 traps on scattered routes. In West Virginia 300 traps were set up in Moundsville and vicinity.

Certification activities.--A large flower grower near Newfield, N. J., cut gladiolus at the rate of 600,000 stalks per week during July. About 5 percent of the cuttings required certification. The remainder was marketed in New York City and New England. One large central New Jersey nursery abandoned lead arsenate treatments of many of its nursery plots. This firm has a large methyl bromide fumigation chamber. Another grower in the Philadelphia area shipped 10,000 cut lilies per day, with the expectation of later increasing the cutting to 20,000 stalks per day. A total of 431 empty refrigerator cars were fumigated during August in the Philadelphia area. Inspectors working along the Delaware River in Philadelphia reported that beetles were generally scarce during the month, with the exception of July 29, when numerous beetles were on the wing around floats on which refrigerator cars were being loaded with bananas.

Farm-products inspection in New York City.--Arrangements were made with the New York City department of docks to lease a space at Pier 23, North River, for an inspection platform in the vicinity of Washington Market, where the bulk of the fruits and vegetables to be certified originate. The platform was opened on July 15. Inspectors were assigned to the platform to cover the period from 8 a.m. to midnight. Delayed adult emergence in the New York City area permitted postponement until July 10 of the prefumigation of refrigerator cars used in transporting bananas from that section. Usually beetle flight in the nearby freight yards necessitates such prefumigation by July 1. Refrigerator cars to be used in the transportation of farm products other than bananas were certified on the basis of pre-inspection and screening.

Increased beetle infestation on "Del-Mar-Va" Peninsula.--The district supervisor in Delaware reports that Japanese beetle infestation in that State is much heavier this season and considerable damage has been done to both orchards and vineyards. Beetles have been found in nearly every classified nursery and greenhouse that was formerly uninfested, necessitating actual treatment or inspection of practically all quarantined articles to be shipped to nonregulated points in the future. Heavy infestation was also reported on the Eastern Shores of Maryland and Virginia. Owing to the heavier infestation, rigid screening requirements on trucks and individual carriers of certified products were enforced. From 7,246 hampers of string beans inspected in the Eastern Shore district, 634 adult beetles were removed, most of them from beans inspected near Princess Anne and Pocomoke, Md. Three beetles were removed from tomatoes.

Screening required for certified articles.--Protection for plant material shipped from the densely infested Japanese beetle area in open containers, such as crates or slatted boxes, was required, starting late in June. A 2-week delay in emergence of adults made it unnecessary to impose this added requirement at the inception of the seasonal quarantine on June 15. Certified material en route through areas where beetles are swarming is subject to reinfestation. Accordingly covering of the plant material with cheesecloth or mosquito netting is required for the duration of the beetle flight. The regulations prescribe that quarantined articles moving from or through the regulated areas during the flight season shall at all times while they are in the regulated areas be screened, covered, or otherwise protected in a satisfactory manner.

Japanese beetle scouting.--Scouting of heretofore uninfested nurseries and greenhouses began in Connecticut on July 9, when three crews started operations. Scouting in Rhode Island, Massachusetts, and New Hampshire started July 15, with seven crews assigned to these States. Scouting operations in Maine got under way on July 18. In the few isolated regulted areas in New Hampshire and Vermont scouting is being taken care of by the district inspectors, who began their surveys on July 15. Scouting in New England indicates about a 2-week delay in the usual emergence dates for adult beetles. Scouting in the New York City area began on July 1.

Increased inspection requests after check-up on common carriers.--Believing that there should be more requests for certification of cut flowers in Albany and Syracuse, N. Y., checks were made by inspectors at express offices, post offices, and bus lines, and the quarantine regulations were again brought to their attention. As a result there was a notable increase in requests for cut-flower inspection.

Farmers meet to discuss Japanese beetle control.--A series of farmers' meetings was held late in July on the Eastern Shore of Virginia for the purpose of discussing methods of control. It was decided that, if State appropriations could be obtained, trapping, spraying, introduction of milky disease, and lead arsenate treating would be advocated.

Long-distance fliers.--A southern New Jersey nurseryman reported that on the week-end of July 24 he took a party from Riverton, N. J., on a fishing trip off the South Jersey coast. He states that on their return trip they encountered a fairly heavy flight of Japanese beetles at an estimated distance of 9 miles off shore. They also saw large numbers of beetles floating on the ocean surface.

Airport inspection.--On July 9 an inspector was assigned to the Philadelphia Airport, in the southern part of the city, to inspect airplanes departing for points in noninfested States. Heavy beetle infestation was reported at the Middletown, Pa., Army Air Base and at the airfield at the New Cumberland, Pa., Army Depot. Trees were sprayed at both of these Army posts.

Catches in city-operated traps.--Reports from the Springfield, Mass., Park Department state that by the end of July they had trapped 361,000 Japanese beetles in 1,650 traps set in the city. The first beetle caught was taken from a trap on June 27. Catches on July 30 numbered 27,000 trapped and 14,000 hand-collected by the 9 men tending the traps.

Plant quarantine mentioned in funeral notice.--During the month there appeared in one of the Boston newspapers a notice of a funeral to be held in Brookline, Mass. The body was to be sent to New York City for interment. The final sentence of the notice read, "Flowers require Federal certification." The principal items of funeral flowers that require Federal gypsy moth inspection when moving to noninfested points are woody plants, such as laurel, used as background material in sprays and wreaths. Many of the florists have revised their method of constructing set pieces so that Oregon huckleberry, an exempt product, is used for a floral backing on pieces going out of the regulated zone.

Infestations removed by inspectors.--The total removals from 60 of the hundreds of lots of products inspected, numbered 346 larvae, 147 pupae, and 2 egg clusters. Forest, nursery, evergreen, and stone and quarry products were included among the infested items. Fourteen larvae and 20 pupae were removed from 4 cords of birchwood inspected prior to its manufacture into novelties for later shipment to points outside the gypsy moth regulated area.

Lumber moves in quantity.--Large quantities of lumber were certified during July, especially from the districts of Portland, Maine, and Concord, N. H. Owing to the large volume of shipping, it was necessary to assign an extra man in each of these districts. Over a million board feet of lumber was certified for shipment from the district of Rochester, N. H., and 85 larvae and 53 pupae were removed from 11 carloads of lumber shipped from Concord, N. H.

Lumber infested for testing egg-removal machine.--A quantity of lumber was borrowed during July from the New England Lumber Salvage Project of the U. S. Forest Service and stored in the city-owned quarry grounds in Portland, Maine, where the boards soon became infested with gypsy moth pupae. After the egg-laying season the infested lumber will be run through machines designed to remove egg clusters.

Increased certification of feldspar.--There was a considerable increase in the demand for the inspection of stone products, particularly of feldspar, in the Portland, Maine, district. It is understood that feldspar is now in demand because of its content of beryl, from which the element beryllium is extracted. Greater demands for this element by the airplane industry is causing the quarrymen to increase their output of feldspar.

Different stages of gypsy moth observed.--Occurrence of different stages of the gypsy moth, as reported by the district inspectors throughout the New England States, was as follows: First pupae noted, Weymouth, Mass., July 5; Baldwin, Maine, July 17; first moths seen, Chelmsford, Mass., July 22 (male); Boston, July 25 (female); first egg clusters noted, Nashua, N. H., and Middleton, Mass., July 22.

Preserved Christmas trees now being shipped.--A concern temporarily located at Littleton, N. H., requested certification of treated fir trees and boughs. This material had been dipped in a solution that acts as a preservative and removes all color from the needles. The material was shipped to Florida, where it will be dyed for use as decorations during the Christmas holiday season.

Reduction in Dutch elm disease confirmations in July.--Comparable scouting activities in representative sections of the Dutch elm disease area indicate that the actual number of diseased trees in 1940 is less than of those discovered in 1939. On a work-area basis the figures of the 2 years cannot be compared, inasmuch as scouting was started a month later this year than in 1939; the number of men assigned to scouting this year is less than half the number in 1939; the greater part of the 1940 scouting is performed by scouts in automobiles instead of the previous systematic foot scouting; the scouting is concentrated in the border zone outside the known disease area and very light scouting is being carried on in the disease area; and, finally, very cool weather and adequate rain in most of the area has kept the elms in very good condition so far as wilt symptoms are concerned. It is in only about 5 percent of the area, surrounding known concentrations of the disease, that systematic foot scouting is under way this year.

Interruption in W. P. A. Dutch elm disease eradication activities.--Pending an allotment of emergency relief funds, the entire W. P. A. personnel was terminated on June 30 until further notice. Field activities during the absence of the security-wage workers were continued by per diem scouts and appointed personnel. W. P. A. workers were recalled in New Jersey on July 8. Work was not resumed by the W. P. A. force in Connecticut and New York until July 15, and in Pennsylvania the men did not report for work until the end of the month. There were 2,096 W. P. A. workers on the rolls at the end of July, and 70 of these were supervisory employees paid from W. P. A. funds on a per annum rate. Five hundred and fifty-six per diem scouts on regular funds, 95 Civil Service appointees, and 59 cooperative State employees completed the Dutch elm disease force.

Elm leaf beetle damage masks Dutch elm disease symptoms.--Elm leaf beetle damage became evident during July throughout the Dutch elm disease work area. It was particularly severe in certain sections. Where the damage was heavy, the leaves were left browned, rolled, and dropping, and wilt symptoms were largely obscured. Japanese beetle feeding also added to the foliage damage in many areas. Heavy elm leaf beetle feeding was noted in a number of locations in Connecticut.

Scolytus multistriatus.--A build-up in the population of this species was noted in the Maryland Dutch elm disease work area. Presence of the beetles was noted for the first time in the Massachusetts work area. Here the beetles had emerged last year and no new galleries were found, although an extensive search was made in the vicinity. S. multistriatus adults were collected in Bedford County, Pa., along Evitts Creek, about 5 miles north of the Maryland State line. This is the first record of these insects having been collected in this county. They were found in logs that had been cut for pulpwood.

Isolated disease concentration found in New York.--North of the Chenango-Broome County line in New York flagging characteristic of Dutch elm disease infection was noted in a number of elms. Elm leaf beetle damage in sections of this area is quite a hindrance to scouting work. The foliage, other than that damaged by the beetle, is generally in good condition. Some of the elms that were affected by the severe drought last year are beginning to show signs of yellowing.

Systematic scouting extended in Athens County, Ohio.--Finding of elms infected with the Dutch elm disease fungus in the western extremity and the south-central extremity of the systematic-foot-scouting area in Athens County, Ohio, led to the addition of several townships to the Ohio work area. One confirmed tree was discovered in Waterloo Township and the other in Lodi Township, in Athens County.

FOREST INSECT INVESTIGATIONS

Copper sulfate solution quickly absorbed by living elm trees.--R. R. Whitten, of the Morristown, N. J., laboratory, submits the following note in connection with his elm-tree-injection studies. It concerns the amount of chemical solution an elm tree will absorb in a given length of time. A standing, living tree measuring 9.8 inches d. b. h., was injected with a solution consisting of three parts of water and one part of copper sulfate, by weight, on July 22. The collar method of injection was used. In this method the outer bark is first shaved off of an area encircling the tree at breast height. Then a kerf is made around the tree about one-third of the way up from the lower edge of the smoothed area. The kerf is made by repeated chisel cuts through from three to four annual rings. Finally, a piece of waterproof material is attached to the tree just below the kerf so as to form a receptacle capable of holding the liquid to be absorbed through the kerf. Mr. Whitten found that the tree used in the experiment absorbed 13,550 cc. of the liquid in 5½ hours. The rate of absorption ranged from 195 to 1,410 cc. per 15-minute interval. After 5½ hours the entire crown of the tree was a dark brown color, owing to the action of the copper sulfate.

Studies of elm insects as possible vectors of phloem-necrosis disease.--D. E. Parker, Columbus, Ohio, reports that the phloem-necrosis disease of elm is now producing striking symptoms on large numbers of elm trees in Columbus and other localities in Ohio. July was much below normal in rainfall and a 2-week hot spell seemed to speed the action of the disease. Intensive studies are being made of various sucking insects which may possibly act as vectors of this virus disease. Large numbers of several species of fulgorids, cicadellids, cercopids, and aphids have been taken while feeding on diseased trees and have been placed in test cages with healthy trees in an effort to find the species that may transmit this disease from one tree to another.

Mountain pine beetle broods destroyed by penetrating sprays.--J. C. Evenden, of the forest-insect laboratory at Coeur d'Alene, Idaho, reports that the experimental control project conducted on the Wasatch National Forest in June 1940 as a test of the practicability of penetrating sprays as a means of controlling the mountain pine beetle in lodgepole pine proved highly successful. Although the trees were large, with extremely thick bark, all insects were destroyed except under bark that had not been properly sprayed. Final cost data are not available at this time; however, the cost will be less than that of the burning-standing method now employed in this region and the results will be more satisfactory. Furthermore, the danger and extra expense associated with the use of fire are eliminated.

Larval disease prevalent in spruce sawfly infestations in southern Vermont and New Hampshire.--P. B. Dowden, of the New Haven, Conn., laboratory, reports as follows on the European spruce sawfly: "Most feeding by first-generation larvae of the European spruce sawfly (Gilpinia polytoma Htg.) was completed in southern Vermont and southern New Hampshire by the last week in July. Larval disease was very prevalent in southern Vermont, and many areas which were expected to be defoliated showed only slight feeding. There was also a general reduction in infestation throughout the severely affected area in New Hampshire. In both sections, however, a considerable number of first-generation cocoons have been formed at some points."

Recovery of outstanding tachinid parasite of gypsy moth introduced from Central Europe.--W. F. Sellers, New Haven, Conn., reports that

Parasetigena silvestris R. D., formerly known as Parasetigena segregata of authors (nec Rondani) and Phorocera agilis of authors (nec Robineau Desvoidy), was recovered during July from several collections of full-grown gypsy moth larvae in very encouraging numbers. In Europe, P. silvestris is the most important dipterous larval parasite of the gypsy moth, commonly destroying 35 percent of this host when it occurs in epidemics. This parasite was colonized in New England in 21 areas between 1924 and 1933. Collections of gypsy moth larvae were made at 5 localities where possibilities were favorable. Results were as follows:

Locality	Date (June)	Larvae collected	Parasites recovered			
			P. silvestris	Compsilura concinnata	Sturmia scutellata	Hyposoter disparis
			Number	Number	Number	Number
Massachusetts:						
Wilmington----	26	3,000	1	42	1	1
Boxford-------	27	5,000	114	113	61	4
Ipswich-------	27	3,000	131	41	1	7
Chelmsford----	28	3,000	103	42	1	5
Acton---------	28	2,000	16	35	54	-

Boxford, Chelmsford, and Acton are former colonization points. Intermittent attempts were made to recover this parasite in previous years, and it was found in insignificant numbers at Boxford, Ipswich, Wilmington, and Acton. P. silvestris is a valuable parasite in Europe and its recovery in such encouraging numbers indicates that it should prove to be an excellent addition to the gypsy moth parasites already established in this country.

Two promising European tryphonine parasites of European spruce sawfly.—W. F. Sellers, New Haven, Conn., states that the following Exenterus material was reared during June and July from approximately 10,000 cocoons of the European spruce sawfly (Diprion polytomum (Htg.)) collected last fall by Canadian entomologists at Parke Reserve, Quebec, Canada, and hibernated at New Haven, Conn. One hundred and eighty males and 195 females of Exenterus marginatorius F. and 119 males and 174 females of E. claripennis Thomson emerged from the sawfly cocoons. E. marginatorius and E. claripennis are common hymenopterous larval parasites of the pine sawfly (Neodiprion sertifer Geoffr.) in Europe. Both species have become established on the European spruce sawfly in Canada and they show considerable evidence of being useful parasites in the biological-control program being conducted against this insect. Twenty, or roughly 10 percent, of the E. marginatorius females were mated under laboratory conditions. Previous attempts to mate this species have been unsuccessful. Two hundred and fifty cocoons have been obtained from sixth-instar spruce sawfly larvae successfully attacked by 17 of the mated females. This progress in attempting to propagate this species under laboratory conditions is attributed to the freshness of the material obtained from the imported spruce sawfly cocoons. Improvements in the technique of mating these species offer considerable promise that propagated material can be used to supplement the colonies obtained from field-collected cocoons as a means of distributing these Exenterus parasites in the United States.

Insect damage to hurricane-felled white pine.--Henry A. Bess, New Haven, Conn., reports that logging operations in white pine timber, blown down in New England by a hurricane in September of 1938, are still going on in a number of places where the timber has not been too severely damaged by insects. During the first part of June a survey was made in a few hurricane-felled stands of white pine near Winchendon, Mass., and about 70 percent of the procumbent trees in certain stands were found to be green and free from attack by bark beetles or borers. Observations made the first week in July indicated that there had been practically no change in the condition of the trees during June.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Regular gypsy moth field employees in New England carry on.--No WPA gyp moth work was performed during the first part of July because of the termination of the services of all W. P. A. employees engaged in gypsy moth work in Connecticut, New York, and Pennsylvania, and the suspension of the workers in Vermont and Massachusetts. Regular gypsy moth field employees carried on as much work as possible during this period but the work was drastically reduced. Frequent heavy thunderstorms during the first week in July necessitated almost daily patrols of temporary wire fences erected around sprayed areas. Regular and careful examinations of the fence lines is necessary, particularly following severe storms or high winds, as the use of fish oil as an adhesive in the arsenical-spray solution causes the poison to adhere to the foliage throughout the growing season. Unfortunately, because of the unusually large number of infestations banded this year and insufficient labor, it was necessary to confine the patrol work to localities where the greatest number of gypsy moth larvae could be readily found.

W. P. A. gypsy moth work resumed in four States.--W. P. A. project applications for gypsy moth work in Connecticut, Massachusetts, and Vermont were approved near the middle of July and work was resumed in those States on July 16 and 17. The project application for gypsy moth work in New York was not approved until the latter part of the month, and work was resumed in that State on July 29. There was some difficulty in obtaining the desired number of men in New York, owing to the assignment of former gypsy moth employees to other projects after the termination of gypsy moth work at the end of June.

Resumption of gypsy moth work in Vermont.--When W. P. A. gypsy moth work was resumed in Vermont on July 16, crews took up scouting where it had been discontinued at the end of June in Stowe Township, in Lamoille County, and in Lowell Township, in Orleans County. Men returning to work in central Vermont were detailed to patrol burlap bands at infested locations in the townships of Bristol, Middlebury, and Salisbury, in Addison County, and also in Brandon Township, in Rutland County. Gypsy moth larvae were found at several of the infestations in these three townships, and it was evident from the size of the caterpillars that feeding will continue well into August. Another crew was assigned to applying burlap bands to trees in Pownal Township, Bennington County, in the southern part of the State. A member of the scouting crew in Stowe Township, Lamoille County, found and killed a gypsy moth caterpillar under a loose piece of bark on the trunk of an apple tree near the edge of a wood. An intensive examination of all tree growth and ground litter within a wide radius of the infested apple tree failed to disclose any further evidence of the presence of the insect. The woodland near the spot where the caterpillar was located provides little growth favorable for the development of gypsy moth larvae. This is the first discovery of infestation in Stowe since 1923, when a careful scouting of the town revealed four single egg clusters.

W. P. A. gypsy moth work resumed in Massachusetts.--On the resumption of W. P. A. gypsy moth work in Massachusetts on July 17, the work was confined chiefly to the application of burlap bands to trees at small infestations that had not been sprayed in June and to the patrolling of banded areas. Field observations indicate that the caterpillar season will extend well into August, although some pupae were found during the latter part of July, thus prolonging the period during which the burlaps may be patrolled with satisfactory results. Supervisors in Massachusetts and Connecticut report that the number of larvae found seems unusually small, considering the great number of egg clusters found in the winter and early in the spring that could not be completely creosoted because they were broken.

Scouting and burlapping work resumed in Connecticut.--Unskilled workers were detailed on July 16 to apply and patrol burlap bands at scattered infestations in the barrier-zone area of Connecticut, while workers in the intermediate grade began scouting in areas that had not been examined for some time in the townships of Cornwall, Norfolk, Goshen, and New Milford, in Litchfield County. Scouting was also resumed in woodland in the vicinity of the infestations found in Southbury, New Haven County, during the fiscal year 1940.

Gypsy moth activities greatly reduced in Pennsylvania.--Regular gypsy moth field employees in Pennsylvania carried on as much gypsy moth work as possible during July, when all W. P. A. gypsy moth work was terminated pending the approval of the project for the fiscal year. They received assistance with the mechanical work in the repair shop and in the field in Lackawanna and Luzerne Counties from a small force of National Youth Administration employees. The field work of the N. Y. A. employees was restricted chiefly to the patrolling of burlapped infestations and the inspection of temporary fences around sprayed areas adjacent to their assembling points, under the supervision of regular gypsy moth agents, in Pittston, Jenkins, and Plains Townships, in Luzerne County, and in Lackawanna, Scranton, and Roaring Brook Townships, in Lackawanna County. It was impossible to examine all the burlapped trees, patrol fence lines, and perform various other required duties in the outlying counties where no N. Y. A. workers were employed. Funds for the resumption of W. P. A. gypsy moth work in Pennsylvania had not been provided by the end of July. At the end of the month regular field employees were busy placing assembling cages in townships where there was no opportunity to conduct intensive scouting, but in which the existence of gypsy moth infestation is questionable.

C. C. C. gypsy moth scouting and thinning work for 1940.--C. C. C. gypsy moth work was done from 5 camps in Massachusetts and Connecticut at the beginning of the fiscal year 1940, with a daily average of 167 enrollees available, but this number had increased to 8 camps in Massachusetts, Connecticut, and Vermont at the end of the year, with a daily average of 367 men working. These men used 70,630 6-hour man-days on gypsy moth work during the fiscal year, while 51,817 man-days were taken from gypsy moth work and used in reducing the fire hazard in the forests. While there was a reduction in the number of hours used on gypsy moth work of approximately 42 percent, the loss of time compares favorably with that of the previous year. C. C. C. work was done on slightly more than 129,000 acres of woodland and open country in 41 towns, all of which were found to be infested. Approximately 23,000 of these acres were in open country, the remainder being mainly woodland, 1,708 acres of which were thinned. The latter figure includes areas where sprouts were removed in the course of following up thinning work done in previous fiscal years. New gypsy moth egg clusters destroyed by creosoting totaled 775,355, and an estimate of 720,950 egg clusters were destroyed by burning. The totals for egg clusters destroyed are obtained by actual count in lightly infested areas and by estimates where the infestations are heavy. Of the egg clusters destroyed, 344,988 were located in Vermont, 289,018 in Massachusetts, and 862,299 in Connecticut.

Gypsy moth burlapping done by C. C. C.--The season during which gypsy moth burlapping work is done covers parts of two fiscal years; therefore, the report for the fiscal year 1940 includes the latter part of the work done in 1939 and the first part of the 1940 season. The report for the fiscal year 1940 shows that 266,458 trees were burlapped, and that 311,454 gypsy moth caterpillars and pupae were destroyed at the bands. During the calendar year 1939, 191,495 trees were burlapped, which resulted in the destruction of 980,588 gypsy moth caterpillars and pupae. The report for the calendar year 1940 shows that, up to the end of July, 153,489 trees on 603 acres were burlapped in Massachusetts, 91,793 trees on 244 acres in Connecticut, and 35,295 trees on 201 acres in Vermont. This work resulted in the destruction of 84,727 gypsy moth caterpillars and 587 pupae in Massachusetts, 45,841 caterpillars and 1,322 pupae in Connecticut, and 132,525 caterpillars and 665 pupae in Vermont. Not so many insects have been killed this season as in some previous years, owing in part to a lack of men available for the work and in part to the fact that burlapping work was started from 2 to 3 weeks later than usual this season, as the cold, wet weather in the spring retarded the development of the insect.

C. C. C. gypsy moth spraying report.--Exhaustion of available spraying materials caused the termination of C. C. C. gypsy moth spraying work on July 2 in Massachusetts and on July 8 in Connecticut. Spraying could have been profitably continued to the middle of July if sufficient arsenate of lead and fish oil had been on hand, as the caterpillars were still active at that time. The C. C. C. spraying work covered 1,243 acres in Massachusetts and 1,573 in Connecticut. No C. C. C. spraying was done in Vermont.

C. C. C. gypsy moth work during July.--There was a sharp reduction in man power available for gypsy moth work at the beginning of the work in July, as compared with the average weekly quota for June. This was due partly to the end of an enrollment period, when experienced enrollees leave the camps and the new men must be trained before participating in active work, and partly to the return to their original camps of men who had been transferred to camps doing seasonal spraying work. However, the gypsy moth crews gradually returned to their normal strength as the new men were assigned to actual work.

The efforts of the available force were concentrated mainly on burlapping work, although some thinning, scouting, and spraying was done during the month. In normal seasons efforts are made to finish the spraying work during the last week in June, but the abnormal conditions this year enabled the work to be continued into July.

Gypsy moth infestation reduced in Massachusetts and Connecticut.--Observations in the area between the barrier zone and the Connecticut River in Massachusetts and Connecticut indicate that there has been an important natural reduction in gypsy moth infestation in that region. No severely defoliated areas were noted, although numerous scattered infestations were reported in areas that had not been sprayed. However, defoliation has been reported at several locations in the central and eastern parts of Massachusetts. The reduction in gypsy moth population is partly due to the killing of many caterpillars and pupae by the "wilt" disease toward the end of the 1939 caterpillar season, to parasitization by other insects, and to the feeding of the imported Calasoma beetle, which aided greatly in reducing the infestation in many areas. While field observations and hatching records showed very little winter mortality this year, it is probable that the unfavorable weather this spring was instrumental in causing the death of many of the caterpillars. Large areas of defoliation were noted in Vermont and New Hampshire, with particularly severe defoliation in Westminster, Rockingham, and Springfield. Several large white oaks were approximately 75-percent defoliated, and female moths were beginning to deposit their egg clusters on these trees.

Qualification ratings of C. C. C. enrollees.--Since the beginning of C. C. C. gypsy moth work east of the barrier zone in New England, in June 1933, the gypsy moth foremen have been required to supply the Federal gypsy moth office with termination of employment reports for enrollees who had worked a minimum of 4 weeks. These reports form the basis for determining the qualifications of the men for this type of work. The enrollees are rated in 5 classifications--best, special, excellent, good, and fair. Those rated as "best" are high-grade employees, usually high-school graduates or with even more advanced education, who displayed special interest in the work and who had ability as leaders. In most cases these men are recommended for reemployment as foremen. Those listed under "special qualifications" are men who are experienced in the work, perform their duties well, and are especially proficient in some branch of the work, such as spur or rope climbing or chopping with axes, or were good leaders and generally helpful to the foremen. The enrollees in the "excellent" and "good" classifications are men who are experienced, have shown an interest in their work, and have displayed an ability to perform their duties well. Many of the enrollees rated as "fair" are men who performed gypsy moth work for only a short period and who would probably develop into good workers with longer experience. Men who are not trustworthy, who are lazy, or who have physical handicaps, such as weak legs or body or poor vision, are not recommended for reemployment on this type of work. Practically all of the men in the higher classifications have worked in heavy infestations, have had experience in all types of gypsy moth control work, and have taken courses of instruction in gypsy moth work. The rating of slightly more than 6,800 C. C. C. enrollees who have done gypsy moth work under the supervision of this Bureau in New Hampshire, Vermont, Massachusetts, and Connecticut has been completed for the period from June 1, 1933, to March 1, 1940. Of this number 143, or approximately 3 percent, were given the "best" rating; 871, or over 12 percent, were rated "special"; 3,538, which is nearly 52 percent, were rated "excellent" or "good;" and 748, or approximately 11 percent, were classed as "fair." The totals show that 5,300, or about 78 percent, of the enrollees were recommended for future employment, leaving 1,529, or about 22 percent, who were not recommended for reemployment on this type of work.

PLANT DISEASE CONTROL

Identification of stem rust specimens.--By August 1 more than 1,500 collections of stem rust had been obtained from representative grain-growing areas throughout the United States and Mexico. Determination has been made of 221 isolates from these collections and about 350 more are in the process of being identified with respect to the particular races of the fungus present. The total number received includes 306 aecial collections on barberry, from which 99 isolates of Puccinia graminis tritici have been made, 31 of P. graminis secalis, and 12 of P. graminis avenae. From the 9 collections of the wheat stem rust that have been identified in aecial material, 7 different physiologic races have been identified, almost as many as were obtained from the 120 uredial collections that have thus far been identified. Races 56 and 17 predominate in the uredial material obtained in the United States, together constituting 66.6 percent of the total number of isolates. From these isolates a total of 8 races has been identified. Work with the collections made in southern Mexico is nearly complete and, of the 94 determinations made, races 38 and 59 appeared in 82 percent of the isolates. Collections from northern Mexico, over half finished, so far show a predominance of race 17.

Severe rust damage limited to small areas.--Wallace Butler reports: "Unlike the wheat stem rust epidemic of 1935, when highly uniform infection progressed continuously in a wide sweep from Texas to Canada, the one of 1940 was much localized, sometimes apparently in a reverse order. In Texas, although the earliest infection developed in the San Antonio area, the heaviest stem rust found early in May was in the area north of Dallas. At the same time central Texas had little stem rust, early drought having prevented heavy infection there. In Oklahoma stem rust became heavy on late wheat in the area west of Kingfisher, while wheat north of it, in the Alva-Pond Creek area, had escaped damage by earlier maturity. In Kansas most fields in the northern part of the State were maturing on June 16 and escaping rust damage, while a large proportion of the fields in east-central and south-central Kansas were still immature and were thus subject to a heavy rust attack, both because of lateness and because of nearness to the source of inoculum to the south. In North Dakota the development was also erratic. Durums, which are frequently free from rust, were the varieties that caused concern this year; furthermore, the only continuous uniform infection found this year was in the Ceres area in the extreme west, whereas in preceding years the eastern part of the State has been the storm center. This difference was due, of course, to the predominance of resistant varieties now being grown in eastern North Dakota. Even within a rusted area there was much variation in the amount of stem rust in different fields owing to varietal reactions and degree of maturity. This localization of areas, and within areas, made loss estimates difficult. The following method was used in estimating: A large number of small samples of wheat were collected at random from the fields of a county. These were taken to the laboratory and graded as to kernel weight, as compared to a normal or undamaged sample. This so-called normal sample was a composite representing the average weight of a number of unrusted samples of the same type of wheat. The weight of 100 kernels of the sample, as compared with the weight of 100 of the standard, was taken as the approximate ratio of the number of pounds of wheat that would be marketed from a field, as compared with what would have been obtained from the field had there been no rust. When this is done with a sufficiently large number of samples to get an average county loss, and weighted for county production, the bushel loss by counties and for the State may be obtained objectively and with a fair degree of accuracy. This, however, does not give the economic loss, which is higher than loss in weight alone because of grade and price reduction on damaged wheat. Although drought, high temperatures, and resistant wheats hampered the development of stem rust in 1940, the elements of an epidemic were there. No wheat examined this year, including Hope, was entirely free from stem rust."

Blister rust kills white pine in Maryland.--It has been known for a long time that blister rust kills white pine. As most of the studies on this subject were made in Europe, New England, and the Northwest, it was decided to make observations in Maryland. These studies were begun in 1937 in Garrett County and have been continued to date. One plot covering 1 acre was established on the south side of the Oakland-Cranesville Road, about 100 yards east of Toliver Run, and another covering 3 acres near the west end of Deep Creek Lake. Fifty-five trees ranging in height from 1 to 15 feet, averaging 3.4 feet, were on the 1-acre plot. The original infection occurred in 1930 and the first tree was killed in 1937. When the last observation was made recently all of the trees were diseased and 43, or 78.1 percent, were dead. A total of 711 cankers, or separate infections, were found. They ranged in number up to 46 per tree, with an average of 12.9. One hundred and ninety-seven trees were found on the 3-acre plot, ranging in height from 1 to 18 feet, and averaging 4.5 feet. Two trees on the area were 30 or more feet in height and, being too large to examine thoroughly, were not included in the study. The original infection occurred in 1931 and the first trees died in 1938. At present 190 trees, or 96.4 percent, are diseased, and 52, or 26.4 percent, are dead. A total of 2,627 cankers were found. The largest number of cankers per tree was 318, with an average of 13.8 for all diseased trees. On and immediately surrounding both of these plots wild gooseberries and skunk currants were present at the rate of several hundred per acre. It is believed that the disease first entered the county about 1924. It is now generally distributed throughout Garrett and western Allegany Counties. Scattered infections have been found on white pines or Ribes in all of the counties in Maryland west of the Chesapeake Bay except Anne Arundel, Charles, Howard, and St. Marys. Owing to the time required for this work no other detailed studies were made in Garrett County. Less-detailed observations indicate that there are other centers of heavy infection, particularly at Crab Run near Grantsville and on the south branch of the Casselman River near Bittinger. The disease is generally distributed throughout the white pines around Deep Creek Lake, where it represents a serious menace to these valuable ornamental trees, unless the wild Ribes are removed. In like manner cultivated currants, gooseberries, and flowering currants are a distinct menace to native or planted ornamental white pine trees. One case was observed in Mountain Lake Park, where cultivated red currants spread the rust to ornamental white pine. In this case the infected parts of the trees were promptly pruned out and the bushes destroyed to prevent further infection. In those sections of the State where the pine was protected by the removal of the gooseberry and currant bushes the spread of the disease is practically negligible. The removal of the Ribes prevents further infection of the trees but does not prevent those trees already infected from dying. In some sections of Garrett and Allegany Counties wild gooseberries and currants are absent or relatively few in number; while in other localities they are so numerous that it is impractical to attempt to grow white pine.

More infection on limber pine in Northwest.--Following publication in the July 1, 1940, issue of the News Letter (v. VII, No. 7, pp. 16-17) of an item stating that the first known infection on limber pine in the Northwest was found on May 31 in the Savenac Nursery at Haugan, Mont., F. O. Walters, blister rust control supervisor of the Kaniksu operation, reported an earlier discovery in this region. This consisted of two trees found this spring by Mr. Walters in the new University of Washington arboretum nursery in Seattle. Concerning the associated Ribes, Mr. Walters reports: "I was informed that all Ribes had been removed from in and around the arboretum, but a search nearby turned up two bushes which probably are Ribes speciosum, the fuchsia-flowered gooseberry."

Forest fires slow control work in Northwest.--Striking with unprecedented fury, "dry lightning" storms swept the northern Idaho and western Montana forests during July to set an all time high of over 2,300 fires, more than 1,300 of which came in 1 10-day report period. With all forests tinder dry from a rainless period of nearly 1½ months, every forest worker was pressed into fire duty to meet this daily bombardment of "strikes." Throughout this area the bulwark of defense was the large number of regular, C. C. C., and W. P. A. camps on blister rust control, a total of about 4,000 men, including many of the best fire foremen, smoke chasers, and fire crewmen available. The fact that most of the fires were confined to areas of less than 10 acres gives evidence of the efficiency with which this situation was handled. During this period rust-control work was almost at a standstill on most forests. Crews returning from 1 fire would be dispatched to another after only a few hours' rest. This siege will undoubtedly result in a reduction of control work to not more than half the anticipated production for July.

Ribes "fruiting" heavy in Northwest.--The Indians say, "much berry, much cold." If this be true, the Northwest is in for a record winter for all native plants are heavily laden with fruits. In this list are serviceberry, wild cherry, thimbleberry, raspberry, Oregon grape, huckleberry, elder, and Ribes. Of the latter extremely heavy fruit crops have been noted on Ribes viscosissimum, R. lacustre, R. petiolare, R. cereum, and R. setosum. Taking advantage of this situation, several seed collections have been made for experimental testing.

COTTON INSECT INVESTIGATIONS

Cultural practices for control of the pink bollworm.--Variety tests conducted by S. L. Calhoun and O. T. Robertson at the Presidio, Tex., laboratory in 1939 confirmed the previous results that there was no resistance to pink bollworm attack exhibited by any variety tested other than an evasion of a portion of the intense late infestation through early maturity. Closer spacing of plants between rows and in the drill has been generally used for reducing the size of the plants and hastening maturity for lessening the weevil damage but, as the boll weevil does not occur in the Big Bend area heavily infested with the pink bollworm, this practice has not been used in that area until the last few years, after experimental work had demonstrated its value against the pink bollworm. In the 1939 spacing tests the plants were thinned to 12, 16, and 20 inches in the drill, with 1 and 2 plants left per hill in each spacing. The average earliness, as measured by the percentage of the crop gathered at the first picking, was higher in all cases with 2 plants per hill than with 1, ranging from 1.69 percent greater in the 12-inch spacing to 9.8 percent in the 20-inch spacing. The total yield was larger in the 12-inch than in any of the other spacings, whether there were 1 or 2 plants left per hill, with the highest yield from 2 plants per hill. The average number of cotton plants per acre in the Presidio Valley has increased from about 7,000 to over 9,000 since 1935 but the records indicate that from 16,000 to 20,000 would give better results under pink bollworm conditions. Farmers of the Big Bend generally delay the first irrigation from 8 to 10 weeks after planting, in the belief that the drying out of the soil will cause deeper penetration of the roots. Experiments in 1939 show that this practice stunts the growth, delays the maturity of the crop, and reduces the yield. One series of plots was irrigated 35 days after planting and repeated when about 50 percent of the moisture had dried out, so there was always sufficient moisture for rapid plant growth, or a total of 6 irrigations; a second series was irrigated 64 days after planting when the first plants showed wilt at 3 p. m., or a total of 4 irrigations; and a third series was irrigated 79 days after planting when the first plants showed wilting at 8 a. m., or a total of 3 irrigations. All irrigations were terminated by September 15 and in addition 7.64 inches of rain fell during the period from April to September. In series 1 the plants remained in a vigorous growing condition and produced 3,301 pounds of seed cotton per acre. In series 2 the plants were stunted slightly, delayed in maturity, and produced 3,151 pounds per acre. In series 3 the plants were badly stunted and stopped growth, but put on a secondary or new growth following the first irrigation and produced 2,231 pounds. At the first picking on August 28, series 1 produced 25.8 percent more cotton than series 2 and 31.9 percent more than series 3; the total yield in series 1 was 4.5 percent greater than in series 2 and 32 percent greater than in series 3. These figures show the advantages of early irrigation on the earliness of the crop and of sufficient water on the total yield, although the first irrigation may be delayed without seriously decreasing the yield, provided the plants are not severely water stressed or the growth stopped. It has been found in the tropics, where the temperature is uniform throughout the year, that low moisture content of the pink bollworm's food induces the formation of hibernating larvae. Another series of tests was conducted to determine if continued high moisture content of the soil, plant, and bolls, as provided by continuous irrigation, would act as a practical control measure by eliminating or reducing the abundance of pink bollworm larvae entering the diapause. In series 1 irrigation was discontinued on July 11, causing some water stress of plants by August 1, although rains prevented severe water stress until late August. In series 2 irrigation was terminated July 31, or about the usual time most farmers discontinued watering cotton of similar age. In series 3 irrigations were continued at intervals of about 10 days until October 12, so that the soil was kept in an almost saturated condition and the plant in continuous growth.

Between August 25 and September 8, 100 percent of the green bolls were infested in all treatments with an average of 9.3, 19.1, and 21.1 larvae per green boll in series 1, 2, and 3, respectively, of which 6.7 percent, 8.0 percent, and 8.7 percent were estimated as being hibernating larvae. After harvest the number of hibernating larvae remaining in the field was estimated to be 35,816 per acre in the water-stressed series 1; 134,552 in the normally watered series 2; and 543,048 in the excess-watered series 3. Thus the continued irrigations throughout the growing season did not reduce the percentage of larvae entering hibernation early in the season but increased the total number of larvae entering hibernation under Presidio conditions, because of the larger population developing in the late green bolls. Ten varieties of cotton were tested in a randomized block in 1939 and a number of plant characters studied in relation to yield and pink bollworm damage. There was a difference of 600 pounds of seed cotton per acre between the highest and lowest yielding varieties, with an average increase of 371 pounds of seed cotton in favor of the eastern varieties over the Acala variety. Comparison of the 2 most promising eastern varieties with 2 strains of Acala cotton showed that 71.3 percent of the yield of the eastern varieties was gathered at the first pick, or in 141 days from time of planting, and 62 percent of the Acala strains at this time. The total number of pink bollworm larvae produced throughout the season was estimated at 664,332 and 1,817,516 per acre, respectively, for the 2 representative eastern varieties and 2 Acala strains, or 2.74 times more larvae for the latter. This is important from the standpoint of damage to the current crop, but even more important from the control angle is the larger number of worms produced late in the season, when most of the larvae go into hibernation. On September 23, the date of the last infestation record, a sharp decrease had occurred in the number of larvae per acre in the green bolls in the eastern varieties, while the number in the Acala was at its peak with 7.41 times more worms per acre than in the eastern varieties. This is accounted for by the much smaller number of late bolls per plant in the eastern varieties, owing to the determinate growth habits that cause them to set a crop of bolls and to practically stop growth and fruiting until most of the bolls have matured. The crop can also be harvested earlier and the fields cleaned earlier where the eastern varieties are used, thereby increasing the dead season when no food is available.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Ginning the new cotton crop.--In the subtropical Lower Rio Grande Valley planting of the cotton crop normally begins around the first of February. Control measures were inaugurated to retard the planting of cotton in an effort to create an effective host-free period for emerging pink bollworm moths and bring about a more uniform fruiting of the crop. We were aided by an extended drought and very little planting was done, except on irrigated acreage, prior to April 1. The completion of harvesting of the 1940 cotton crop in that area will be only slightly later than usual. Harvesting of the crop will probably be completed early in September, which is about normal. Owing to extremely hot weather, cotton in the Coastal Bend area began opening fast after the first of July, and the first bale was ginned on July 8. Sterilization of seed as ginned is required for all regulated counties in southern Texas. Through exceptionally fine cooperation of ginners with inspectors of this Division, all ginning and sterilization equipment was in very satisfactory condition by the time the cotton season got under way.

Gin-trash inspection.--Inspection of the 1940 cotton crop began in the lower Rio Grande Valley of Texas on July 17, with one crew stationed in the San Benito-Brownsville area in Cameron County. A few days later machines were stationed at McAllen and Weslaco, in Hidalgo County, and before the close of the month additional machines were placed at Raymondville, in Willacy County, and at Matamoros, Mexico. Pink bollworms were taken at all machines. At the close of the period results of inspection showed that a much lighter infestation existed in Cameron County than was present in the 1939 crop and only 1 pink bollworm was taken from trash collected at Brownsville, where an extremely heavy infestation was present last season; however, there was a considerable increase in infestation in the eastern part of Hidalgo County over the 1939 season.

Okra inspection.--The first pink bollworm infestation in okra in the lower Rio Grande Valley was discovered early in August 1939, and as a result this commodity was placed under quarantine. Inspection of the 1940 spring okra began around the first of May and was continued throughout July, with no evidence of the pink bollworm having been found through the examination of 376,052 okra forms. Although okra shipments were discontinued toward the close of the month, inspections will be continued in an effort to determine at what time in the summer or fall okra may become infested. Toward the close of July, State Quarantine Proclamation No. 67-L was amended, prohibiting the growing of okra in the lower Rio Grande Valley between October 1 and December 31. During the 1939 season infestation was found in growing okra in every month from August to December, inclusive.

Subsoil stalk cutter for field clean-up.--For the last several months experiments have been carried on by this Division toward the development of a plow for the killing of cotton stalks which could be built economically and could be pulled by small work animals, such as are used in Mexico and by the Latin-Americans on this side of the Rio Grande. It is believed that such a plow has now been developed, and a number of these implements were built and placed at strategic points throughout the south Texas regulated area and in Mexico, in order that farmers might have an opportunity to observe these implements and try them out under actual field conditions. At the end of the period a number of tests had been made through the cooperation of several farmers, with very satisfactory results.

Vehicular inspection.--Operation of the Falfurrias road station, located on the principal highway leading out of the lower Rio Grande Valley, was begun by this Division on July 15 and during the remainder of the period inspection was maintained on a 24-hour basis. Toward the close of the month there was a considerable movement of cotton pickers out of the area. A total of 7,520 cars was inspected and 158 confiscations were made. Four road patrols operated on important highways leading out of the Panhandle area during July, in connection with quarantine enforcement in that area.

Survey for wild cotton in Cuba.--Pink bollworm infestation in southern Florida has been appreciably reduced in connection with the effort toward the eradication of its host plant, wild cotton, and it now appears likely that this insect will be eliminated prior to the complete eradication of all wild cotton plants. Therefore, in an effort to determine the possibility of reinfestation from some outside source, it was believed advisable to make a survey with the object of determining actual conditions with reference to wild cotton in Cuba and the possible existence of the pink bollworm, this region being considered the most potential source of reinfestation. Consequently, a party of four inspectors of the Florida district left for Cuba on July 28 and the survey was completed the last of July. Wild cotton was found to be established at two locations near Batabano on the southern coast south of Havana. Following this finding, other locations of wild cotton were reported to our inspectors but, inasmuch as the cotton at the above locations was not in fruit, it was considered advisable to delay the trip into other areas until it was possible to make inspections for the pink bollworm if any plants should be found. Prior to the findings at Batabano, a considerable number of cotton plants was found in dooryards and along the roadsides in a number of locations, most of these being along the north-coast line. Inspection of this cotton showed a general pink bollworm infestation, bolls being practically 100-percent infested at Cardenas and La Isabela. From four to six worms were found in some of the bolls and many of the worms had pupated. Infestation was not established in the wild cotton found at Batabano.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Most feeding by imported cabbage worm done by last-instar larvae.--A series of laboratory experiments was performed by C. E. Smith and R. W. Brubaker, at the Baton Rouge, La., laboratory, to determine the quantity of food consumed by the larvae of Pieris rapae (L.). The larvae, kept in petri dishes, were supplied daily with a definite quantity of fresh cabbage leaves. As the surface area and weight of the leaf pieces supplied were recorded, the weight of fresh cabbage consumed each day was computed by determining the leaf area eaten. The mean temperature of the room in which the tests were carried on was about 70° F., with extremes of 65° and 75°. The following table shows for each instar of P. rapae the average duration, the average maximum weight, and the average total weight of food consumed. These averages represent data from 55 to 65 specimens in each instar.

Larval instar	Average duration	Average maximum weight	Total average weight of fresh cabbage eaten
	Days	mg.	mg.
First	3.1	0.7	6.9
Second	2.8	3.2	28.4
Third	2.4	11.6	68.2
Fourth	2.8	50.0	218.5
Fifth	5.5	190.8	1,422.0
Total	16.6	--	1,744.0

The data show that 81.5 percent of the cabbage required for development of the imported cabbage worm was consumed during the fifth instar. They also indicate the necessity for controlling larvae of this insect on cabbage before they reach the fifth instar. Feeding into the head of a cabbage by one of these caterpillars is sufficient to prevent marketing the head as U. S. Grade No. 1.

Productiveness of tobacco flea beetle in tobacco plant beds reduced by cultural operations.--J. U. Gilmore and associates, of the Oxford, N. C., laboratory, have found that several methods of destroying tobacco in plant beds are effective in reducing the numbers of Epitrix parvula (F.) that mature and emerge in tobacco plant beds, when these methods are applied as soon as transplanting to the field is complete and before the first generation of beetles begins to emerge. Where the plants were allowed to remain undisturbed after transplanting was completed an average of 432.6 beetles per square foot of plant bed emerged during June. Where similar areas were thoroughly broken with a plow an average of 247.2 beetles per square foot emerged. Similar areas that were plowed and harrowed produced an average of 154.4 beetles per square foot of plant bed during this period. The most effective treatment was that of pulling all of the plants by hand, then scraping the surface of the bed with a hoe. From areas treated in this manner an average of but 130.7 beetles per square foot emerged during June. As a general farm practice, very few of the plant beds are destroyed after transplanting is completed.

Thrips population increases and decreases rapidly on vegetables.--Field studies conducted during the spring of 1940 by C. B. Wisecup, at the Sanford, Fla., laboratory, resulted in valuable information concerning the seasonal abundance and distribution on a number of vegetable crops of one of the species of tropical flower thrips (Frankliniella cephalica D. L. Crawford) and the onion thrips (Thrips tabaci Lind.). The studies showed that populations of these 2 common species of thrips varied greatly on different vegetables; that the time of their peaks of abundance varied greatly; and that the increases and decreases in infestation occurred rapidly. For example, an infestation of 4 thrips per blossom on beans late in March increased to 60 by April 15. Of this population T. tabaci never constituted more than 5 percent. On Bidens an average infestation of 10 thrips per blossom during the first week in April increased to 40 in 1 week. On squash there was an average of 10 thrips per blossom late in April, 25 percent of which were the T. tabaci, which early in May had increased to 30 per blossom. This infestation declined to 1 thrips per blossom by June 15. The onion thrips rapidly disappeared on squash in early May. The thrips infestation on celery, composed of F. cephalica and T. tabaci in about equal numbers, never exceeded an average of 120 thrips per 10 sweeps of an insect net. The onion thrips seemed to migrate from harvested celery fields to nearby peas and they appeared to breed rapidly on the peas, there being as many as 15 per blossom by the end of March.

A tropical flower thrips less destructive than onion thrips in Florida.--Laboratory tests conducted by C. B. Wisecup, of the Sanford, Fla., laboratory, substantiated field observations that most vegetable flowers can tolerate high infestations of one of the species of tropical flower thrips, Frankliniella cephalica D. L. Crawford, because feeding injury by this insect is confined primarily to the highly pigmented portion of the flower. The onion thrips seemed to blast many of the blossoms of peas and the spring crop was so badly stunted from thrips damage that it was a complete failure, notwithstanding the continued cool weather. Other observations indicated that the blossom drop of peppers was not caused by injury from thrips; that squash blossoms probably may not be damaged, even by excessive numbers of thrips, and that thrips caused no damage to strawberries.

Plant bugs on lettuce controlled by insecticides.--K. B. McKinney, of the Phoenix, Ariz., laboratory, reports that derris-sulfur-talc and paris green-sulfur-talc dusts controlled the plant bug Corizus sp. in small experimental plots of lettuce being grown for seed. In 1 test 3 applications of a derris dust containing 0.5 percent of rotenone in a mixture of 1 part of sulfur to 3 parts of talc gave 94 percent control of the adults and 91 percent control of nymphs where there was an average of 857 nymphs and 221 adults per plant on the undusted plots. In the same test a mixture containing 1 part of paris green to 4 of sulfur and 5 of talc gave 93-percent control of the adults and 91-percent control of the nymphs. The derris-sulfur mixture was applied at a rate of 60 pounds per acre per application, and the paris green-sulfur mixture at the rate of 49 pounds. During the period of these tests there were decided increases in the infestations of nymphs and adults of Corizus sp. on the untreated plots in the series. Applications at intervals of 5 days or less may be necessary to combat reinfestation of the lettuce brought about by the influx of this plant bug from outside sources and the rapid rate of its development.

INSECTS AFFECTING MAN AND ANIMALS

Dove to direct work in Southeastern States.--W. E. Dove returned to research work in this Division in the latter part of July, after having been engaged in the direction of screwworm, grasshopper, and chinch bug control for the last 5 years. Mr. Dove is to have general direction of the laboratories of the Division located in the Southeastern States and will be in immediate charge of the Gulf coast tick and "dog fly" (Stomoxys calcitrans) investigations, with headquarters at Panama City, Fla.

Screwworms becoming abundant in parts of Texas.--D. C. Parman and associates, reporting on a survey of Cochliomyia americana C. & P., state that there has been a general decrease of the screwworm along the lower Balcones escarpment in western Texas during July and a general increase on the upper escarpment, especially on the eastern part. It has been supposed that this year screwworm flies reached the area on the eastern escarpment that is heavily populated with deer early enough to build up the high infestation there in fawns, and this has been substantiated by inquiry.

Trap automatically baited with flies captures screwworm flies.--H. M. Brundrett, in discussing the development of control traps, reports that the inverted-cone trap with windmill stirrer, which empties the flies into the bait tub to replenish the bait, has made good catches during the month and has taken approximately as many C. americana and other flies as other traps in the vicinity, without addition of other baits than flies and water. This trap was started on April 2 with two rabbits and 1½ gallons of citrated blood.

Diphenylamine appears superior in protecting wounds from screwworms.--From the studies of H. E. Parish, at the Menard, Tex., laboratory, it appears that diphenylamine is slightly superior to either diphenylene oxide or a-nitronaphthalene in protecting wounds from screwworm reinfestations, but the numbers of wounds treated at each interval in both the infested and non-infested areas are too few to draw conclusions.

Results of tests with "smears" against screwworms.--Although incomplete, the studies of Roy Melvin and associates at the Menard, Tex., laboratory indicate (1) that the addition of lanolin to a smear decreases the toxicity of benzol in screwworm larvicides and wound protectors; (2) the toxicity of benzol is reduced by excessive amounts of diphenylamine; (3) the addition of zinc oxide to benzol containing smears "steps up" the toxicity of the smear; and (4) several of the mixtures tested are effective in killing the largest larvae of *Cochliomyia americana*, even in bloody wounds in cattle, but they do not give the same protection to the wounds from reinfestation that is effected by the regular treatment of diphenylamine.

Effectiveness of pyrethrum emulsions on mosquito larvae influenced by temperature.--W. W. Yates, of the Portland, Oreg., laboratory, reports that tests with larvae of *Aedes vexans* Mg. and *A. lateralis* (Mg.) have shown that the toxicity of pyrethrum emulsions is decreased by low temperatures. For example, kills of 99 percent were obtained at 78° to 80° F., 68 percent at 58° to 60°, and 50 percent at 45° to 50°. A temperature of 56° to 60° is often encountered in mosquito-breeding waters in the Portland area. It is therefore possible that the poor kills frequently reported with pyrethrum emulsions may be due to this factor.

FOREIGN PLANT QUARANTINES

Customs help again gets the fruitfly.--M. E. Winters, customs inspector at Del Rio, intercepted a mango in a paper sack on June 8 and when the plant quarantine inspector came on duty watched him open the bag. Mr. Winters noted that an insect from the bag hit the screen. It proved to be *Anastrepha ludens* (Loew). This is just one of the many instances where the wholehearted cooperation of the customs personnel has materially aided in preventing entry of unwanted pests.

Hawaiian avocados infested with Mediterranean fruitfly.--Examination of 4 large avocados found in the personal baggage of a passenger arriving at San Francisco from Honolulu on the S.S. *Lurline* on June 5 showed one of the fruits to be heavily infested with larvae of the Mediterranean fruitfly. From this single fruit 21 large, nearly mature larvae were removed. The owner of the fruits was destined to Sutter County in the heart of the peach-producing area in California. All 4 fruits were destroyed in the galley steamer on board ship.

Formosan termites in roots of palm from Japan.--Inspection of 250 root stalks of a small palm, *Cycas revoluta*, arriving at San Francisco as passenger baggage on one of the large Japanese liners from Japan, destined for planting in Berkeley, Calif., disclosed numerous live soldiers and workers of the Formosan termite (*Coptotermes formosanus* Shir.) working in several of the roots. This is one of the most destructive species of termites known in the Orient and in the Hawaiian Islands and is not known to occur here. Its tropical nature might preclude its becoming established, but this is a chance we cannot afford to take. In this instance the termites had almost completely hollowed out the stalks in which they were found working. The infested stalks were both thoroughly hand-cleaned and subjected to methyl bromide fumigation under vacuum and the effectiveness of the treatment was checked before the plants were released.

Entomological interceptions of interest.--A living larva of the trypetid *Anastrepha mombinpraeoptans* Sein was intercepted at Baltimore, Md., on July 15, 1940, in a mango in quarters from Haiti. Sixteen larvae of the trypetid *Anastrepha suspensa* (Lw.) were intercepted at New York on June 30, 1940, in grapefruit in stores from Haiti. Nine living larvae of the Mediterranean fruitfly (*Ceratitis capitata* Wied.) were taken at San Pedro, Calif., on July 3, 1940, in a mango in baggage from Hawaii. A living specimen of the curculionid *Conotrachelus aguacatae* Barber was taken at Brownsville, Tex., on June 20, 1940, in a seeded avocado in baggage from Mexico. Fourteen larvae of the pink bollworm (*Pectinophora gossypiella* (Saund.)) were intercepted at New York on July 10, 1940, in an okra pod in stores from Brazil. One living adult of the curculionid *Cossonus excavatus* Boh. was found at Laredo, Tex., on June 24, 1940, on pineapple in cargo from Mexico. An adult helodid *Scirtes oblongus* Guer. was intercepted at El Paso, Tex., on June 7, 1940, on pineapple in cargo from Mexico. Eight living larvae of the curculionid *Palaeopus costicollis* Mrsh. were found in sweetpotatoes in stores at New York on July 11, 1940, from the French West Indies. Specimen of the coccid *Leucaspis japonica* (Ckll.) was taken at Boston, Mass., on June 9, 1940, on cherry shrub in crew's quarters from Japan. Specimens of the coccid *Targionia hartii* (Ckll.) were taken at Boston, Mass., on June 7, 1940, on yams in baggage from Barbados. A living adult of the curculionid *Parasomus jansoni* Sharp was found at Brownsville, Tex., on July 12, 1940, in the cabin of an airplane from Cristobal, Canal Zone. Living specimens of the bostrichid *Heterobos trychus aequalis* (Waterh.) were taken at Philadelphia, Pa., on June 18, 1940, in packing cases in cargo from India.

Pathological interceptions of interest.--Plant disease interceptions for which determinations were received during the month included: *Ascochyta caricae* Pat. on papaya fruit in baggage from Brazil found at New York on July 23 (see P. Q. C. A. News Letter dated May 1, 1932, p. 4); galls of *Bacterium tonellianum* Ferraris on oleander cutting in baggage from Mexico on July 17 at Laredo; *Cercospora odontoglossi* Prill & Del. on *Odontoglossum* sp. from England on April 30 and May 17 at Washington; *Cerebella andropogonis* Ces. on *Paspalum dilatatum* seed in mail from Australia on May 21 at Baltimore; *Coryneum microstictoides* Sacc. & Penz. on *Paeonia moutan* in mail from France on May 3 at San Francisco; a disease tentatively determined as *Cylindrosporium colchici* Sacc. on seed of *Colchicum autumnale* in cargo from Jugoslavia on February 15 and from Hungary on February 26 at New York; *Eutypella cocos* Ferd. & Winge on coconut husks in cargo from Canal Zone on March 21 at New York; *Gloeosporium affine* Sacc. on *Dendrobium chrysotoxum* in mail from Thailand (Siam) on April 22 at San Francisco and on *Epidendrum* sp. in mail from Costa Rica on June 5 at Seattle; *G. cymbidii* Verpl. on *Cymbidium pauwelsii* in mail on May 6, and on *Cymbidium* sp. in cargo on April 17 from Japan at Seattle; *G. laeliae* P. Henn. on *Laelia purpurata* in baggage from Brazil on February 2 at San Francisco; *Gloeosporium* sp. (unlike *G. oncidii* Oud.) on *Oncidium varicosum* in air express from Brazil on February 8 at San Francisco; *Gloeosporium* sp. (with spores unlike those of *G. cypripedii* Verpl., the only species reported on *Cypripedium*) on *Cypripedium callosum* in mail from Thailand on February 6 at San Francisco; *Glomerella* sp. (no species reported on the host genus) on *Stenospermation sessile* in mail from Guatemala on May 22 at San Francisco; *Leptosphaeria musarum* S. & H. on *Musa* sp. (under special permit) in express at Washington on January 6; *Macrophoma oncidii* P. Henn. on *Cattleya* sp. in baggage from Mexico on April 1 at Brownsville; *Ophiobolus* sp. (not *O. graminis* Sacc.) on grass in cargo from Liberia on May 1 at New York; *Phyllosticta* sp. (unlike any species described on orchids) on *Schomburgkia humboldtii* in baggage from Venezuela on May 16 at New York; *Phytophthora* sp. on string beans in baggage from Mexico on July 11, 22, and 23 at El Paso; *Physalospora japonica* Togashi on *Camellia japonica* in mail from Japan on February 14 at San Francisco; *Puccinia cesati* Schroet. on *Andropogon annulatus* from Egypt in stores on April 19 at New York; *Trullula olivascens* Sacc. on *Paeonia moutan* in mail from France on May 3 at San Francisco; *Uredo incomposita* Kern on *Eleocharis interstincta* in cargo from Haiti on July 20 at New York; and *Ustilago bromivora* Fischer de Wald. on *Bromus tectorum* in baskets of cipollini in cargo from Italy on February 23 at New York.

DOMESTIC PLANT QUARANTINES

Grasshopper-survey conference.--Plans and procedures for conducting the fall survey of grasshopper adults and egg beds were outlined in a meeting held in Denver on July 22 when the State leaders' committee met with field, area, and survey supervisors and Bureau workers from Washington. Members of the committee present were T. L. Aamodt, chairman, Minnesota; George G. Schweis, Nevada; Sam C. McCampbell, Colorado; W. P. Flint, Illinois; F. Gray Butcher, North Dakota; H. B. Mills, Montana; and E. G. Kelly, Kansas. Bureau representatives from Washington included Lee A. Strong, C. M. Packard, B. M. Gaddis, and R. A. Sheals. J. R. Parker, in charge of the Bozeman, Mont., laboratory of Cereal and Forage Insect Investigations, was also present.

Grasshopper-control operations near close.--Bureau-paid grasshopper-control activities were terminated for the season in North Dakota, South Dakota, Montana, Oklahoma, and Texas in July. A sufficient number of employees and laborers were being retained to concentrate the equipment and materials.

New infestation of long-winged grasshopper in Colorado.--A rather light but previously unreported infestation of *Dissosteira longipennis* Thos. was found the latter part of July in Kiowa County, Colo., extending over about 196 sections of land into Greeley County, Kans. Other areas in which infestations of the pest had previously been reported in Colorado were again scouted during the month and only a very scattered adult population was found. There was no indication of banding for egg-laying purposes.

'Hopper situation in Montana and Minnesota.--In the Great Falls, Mont., area harvesting of winter wheat was practically completed by the close of July with little damage done to the crops, owing to the combined control activities of farmers, counties, and State and Federal workers. Across the international boundary where the 'hopper infestations were no greater than those in Montana, damage ranging from 50 to 100 percent was noted over extensive crop areas. In this section of Canada 100-percent defoliation of such ornamental plants as *Caragana* was noted. In the Red River Valley of Minnesota excellent control has been reported and the harvesting of grain was well under way in July. Adult 'hoppers are milling about in that area but no heavy flights have been reported. Bait demands subsided the latter

part of July, although mixing stations in two counties were still operating on a 16-hour schedule. Nearly 7,000 tons of dry-bait materials had been distributed to farmers in three Minnesota counties to the close of July.

Grasshopper-baiting activities in Nebraska.--Activities were increased in southeastern Nebraska and also the northeastern part of the State when hot, dry weather in July dried out native vegetation. The grain had been harvested and farmers became aware that the 'hoppers had moved into the cornfields. Crops in western Nebraska were severely damaged by the extreme heat and lack of rain during the month.

Grasshopper development.--Hatching of a second generation of Melanoplus mexicanus Sauss. was reported in the Texas-Oklahoma-Kansas-Colorado area the middle of July with third-instar nymphs present. In Baca County, Colo., desiccation is causing a heavy reduction in the number of viable eggs in pods, as evidenced by a 90-percent destruction in one field in which intensive examinations were made. In Pueblo and Las Animas Counties, Colo., 'hopper mortality caused apparently by a fungus disease was reported. As many as 10 'hoppers per square yard were killed by the fungus in Pueblo County.

Mormon cricket-control work nearing completion.--Mormon cricket control had been completed in almost all areas of the cricket-infested States by the close of July. Operations on a greatly reduced scale were in progress in the vicinity of Mountain City, Nev.; in Baker and Malheur Counties, Oreg.; in Clark, Owyhee, and Washington Counties, Idaho; and in Crook and Sheridan Counties, Wyo. Surveys of adult crickets have been completed in Utah, Washington, Montana, and in several counties in Idaho, Oregon, Wyoming, and Nevada. The egg survey was in progress in several of the States at the close of the month.

Chinch bug control.--Migrations of chinch bugs in the heavily infested States of Indiana, Illinois, Iowa, Missouri, Nebraska, and Oklahoma reached a peak about July 15, after which the corn growth had developed to a point where the bugs caused little damage. The last orders for creosote were filled on July 29 and were shipped to two points in Illinois near the northern periphery of the infested area. A total of nearly 2½ million gallons of creosote was shipped between June 15 and July 29 to 167 counties in 7 States, almost 60 percent of it going to 45 counties in Iowa. The value of fall surveys is apparent, as indicated by the counties supplied with creosote, which followed closely the predictions of the Federal-State survey conducted last fall, the most heavily infested area being within approximately a 150-mile radius of the area where the States of Iowa, Nebraska, Kansas, and Missouri join.

White-fringed beetle control.--The weather conditions prevailing over practically all the infested areas in July were more favorable to effective control work than had been the case in June. The effective application of control measures coincided with what appeared to be the peak of emergence in the Florala and Monroeville, Ala., areas and a second smaller peak in the vicinity of New Orleans. Good kills were reported from nearly all areas. Scouting of the Central of Georgia and the Atlantic Coastline Railroad yards and rights-of-way for 22 miles resulted in finding no beetles.

Phony peach and peach mosaic inspection.--The inspection of the environs of nurseries and budwood sites for the phony peach and peach mosaic diseases having been completed, the cooperative project activities in July were primarily concerned with the inspection of properties formerly found infected and those adjacent thereto. In some areas in California and Colorado second inspections for the season were made. Inspections were completed in 109 counties in 14 States. The inspection was conducted by 104 inspectors, of which 60 were Bureau employees, and 44 employed by cooperating States. Inspections were completed in Illinois and Tennessee during the month. Inclement weather during the first half of July interfered somewhat with inspection for the phony disease. However, these summer rains in Texas kept the foliage in a vigorous growing condition thereby extending the period during which an accurate diagnosis of peach mosaic could be made. It has been reported that all mosaic trees found in the Ontario district of San Bernardino County, Calif., have been removed, this being the first time such progress has been reported.

Phony peach disease being eradicated from Illinois.--Inspections for the phony peach disease have been completed in Illinois for the season, with the result that no disease was found in the State. Four years ago phony peach infection was known to exist in 13 counties in the State. Last year the disease had been reduced to but 1 county.

Transit inspection.--As is usual for this time of the year, plant shipping fell off considerably through all terminals and the shipping of cut flowers showed a marked increase. The movement of refrigerator cars of fruits and vegetables to points in the Middle West from the area of heavy Japanese beetle flight has been lighter than in former years, owing to the excellent growing conditions in the Midwest areas. However, 192 cars of such produce were inspected at Chicago. Inspection of cut-flower shipments at Pittsburgh resulted in the discovery of live insects including 2 lepidopterous larvae in a shipment of cut flowers moving from Virginia to Ohio. Inspectors at New York City intercepted shipments containing live rose chafers and a coleopterous larva. In the month's work at the various stations, interceptions were made of 42 violations of the gypsy moth quarantine, 102 violations of the Japanese beetle quarantine, and 6 violations of State quarantines relating to this beetle.

Transit inspection at Buffalo.--The importance of the Buffalo station, which is being operated during the summer months for the first time, is indicated by the number of violations that are being intercepted at that point each month. Considering that the station is operated by only one man, it compares favorably with the other stations in the northeastern area.

CONTROL INVESTIGATIONS

Effect of poisons on glycogen counts and indices.--At the Beltsville, Md., laboratory, J. Franklin Yeager and Sam C. Munson report that the glycogen count and glycogen index of the blood were altered when arsenical and fluoride insecticides and mercuric chloride were administered as stomach poisons to southern armyworm larvae. The glycogen index is the total percentage of blood cells that contain glycogen inclusions. The glycogen count consists of the percentage of cells containing glycogen inclusions, grouped according to whether the cells contained 0, 1, 2, 3, or more than 3 glycogen inclusions. In the unpoisoned controls, the glycogen count had the following form: $0 > 1 > 2 > 3 < 3+$, with respect to numbers of cells. It was found that the 3+ class was greater than the 3 class because of a certain type of blood cell which contained numerous, very small glycogen inclusions. This form of the glycogen count tended to persist as the glycogen inclusions disappeared from the cells in the poisoned larvae, i. e., as the glycogen index tended to approach zero. As the glycogen index increased in the glucose-fed, unpoisoned control larvae, the glycogen count changed in such a way that its usual form was maintained but its peak shifted to the right from class 0 to class 1. Average glycogen counts from the fore and the hind ends of ligatured control larvae had the same form. The effects on glycogen count and glycogen indices that followed arsenical, fluoride, and mercuric chloride administration were not observed when nicotine, nicotine bentonite, nicotine peat, rotenone, pyrethrum, and phenothiazine were used.

INSECTICIDE INVESTIGATIONS

A new percolator.--The investigation of plant materials for possible insecticidal properties requires apparatus suitable for the percolation of the ground plants in quantities ranging from several hundred grams to several kilograms. A simple, automatic continuous apparatus meeting these requirements has been constructed by M. S. Schechter and H. L. Haller and used successfully for some time in the laboratory. The apparatus is inexpensive and, for the most part, uses standard laboratory equipment.

Composition of a commercial geraniol.--Although commercial geraniol has been used for a number of years in baits for the Japanese beetle, no detailed chemical studies of this material have been reported. H. A. Jones and H. L. Haller have recently completed an examination of a sample of geraniol which had previously been found by W. E. Fleming, of the Division of Fruit Insect Investigations, to be unusually attractive to the beetle. The product contained about 35 percent of the alcohol geraniol, with smaller amounts of citronellol and esters of both of these. Over 25 percent of terpenes, sesquiterpenes, and sesquiterpene alcohols were present. About 1 percent of eugenol was found. The principal constituents of this commercial geraniol have been prepared by these workers in pure condition. These, together with commercial fractions of Java citronella oil obtained by R. D. Chisholm, of the Moorestown, N. J., laboratory of this Division, are being tested this season by W. E. Fleming for attractiveness to the Japanese beetle.

Composition of "Genecide."--Entomologists and fruit growers, especially in the States of Washington, Oregon, and California, have been interested in the promising results obtained in the control of codling moth larvae by the application of Genecide in the form of a spray. Circular 136, issued July 1939 by the Connecticut Agricultural Experiment Station, states that Genecide contains 55.8 percent xanthone, 43.3 percent clay, and the remainder water and a trace of phenol. This same circular also gives the analysis of Elgetol, Dowspray Dormant, and a number of other proprietary insecticides whose composition is not generally known.

Imports of rotenone plants steadily increasing.--The following data show the growth in the consumption of derris and Lonchocarpus (barbasco, cubo, and timbo) in the United States:

Plant material	1936	1937	1938	1939	1940[1]
	Pounds	Pounds	Pounds	Pounds	Pounds
Crude cube and timbo root------	704,120	576,151	590,854	1,907,194	1,130,879
Powdered cube and timbo root-----	1,124,936	1,263,773	1,735,995	896,640	327,589
Crude derris root	510,337	572,652	746,661	2,335,048	1,826,657
Total---------	2,339,393	2,412,576	3,073,510	5,138,882	3,285,125

[1] First 6 months.

BEE CULTURE

Carbohydrate metabolism of developing worker honeybee.--R. M. Melampy, of the Southern States Bee Culture Laboratory, University, La., reports a marked increase in total carbohydrate and glycogen during the development of the honeybee. The maximum storage of both of these materials occurs between the fifth and sixth days, which is approximately the end of the larval-feeding period and the time the cell is sealed. The total carbohydrate at this time is 100 mg. and the glycogen 68 mg. per gram of tissue; however, 12 days later the total carbohydrate has decreased to 9 mg. and the glycogen to 0.9 mg. per gram. At the time of emergence a very small amount of carbohydrate reserve remains. In addition to glycogen, there is in the tissues of the immature honeybee a reserve carbohydrate which is convertible, by acid hydrolysis, to reducing sugar. Free reducing sugar is found in the tissues of larval and pupal honeybees.

Changes in color of nectar.--Geo. H. Vansell, of the Pacific States Bee Culture Laboratory, Davis, Calif., reports that certain nectars, which are colorless at the time of secretion, and sirups take on color when stored in dark combs from certain locations. As the sugar concentration of sirup was increased the rate of darkening decreased very noticeably. The familiar change in water, to a dark amber color, with the soaking of old combs is perhaps a result of this coloring phenomenon. Just what is the source of this color is not yet clear. The effect on color in nectar, sugar sirup, and water by exposure[1] to used bee comb in the laboratory experiments at Davis[2] was as follows:

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[1] The checks stored in glass at 70° to 80° F. were still colorless after 3 months.

[2] The same materials exposed in an old comb from the fireweed area changed very slightly.

Material	Time in cells	Original color	Final color	Remarks
	Hours			
Fuchsia nectar----------	8	None	Pale yellow	Hand collected
Do-------------------	17	do.	Yellow	Do.
Poinsettia nectar-------	24	do.	do.	Do.
Orange nectar-----------	24	do.	do.	Do.
30-percent invert sirup	10	do.	Pale yellow	Sucrose, water, and tartaric acid boiled 10 minutes
Do-------------------	24	do.	Yellow	Do.
Distilled water---------	24	do.	Amber	

IDENTIFICATION AND CLASSIFICATION OF INSECTS

First-instar larvae of Pantomorus readily distinguishable.--Recently a large lot of first-instar larvae of Pantomorus leucoloma (Boh.) was received from the Division of Cereal and Forage Insect Investigations, and there are now available for study, in the collection of the National Museum, adequate samples of first-instar larvae of three species of Pantomorus, namely, P. leucoloma (Boh.) from Florala, Ala.; P. peregrinus Buch. from Saucier, Miss.; and P. godmani (Cr.) from Anson County, N. C. A cursory examination of specimens from these samples shows the first-instar larvae to be as readily separable as the mature larvae and pupae.

A stinging ant frequently intercepted at ports of entry.--An ant, commonly intercepted in plant shipments from tropical America, is a species of Wasmannia, apparently rochai Forel. A very close relative of this ant, Wasmannia auropunctata (Roger), is now established in a number of localities in Florida, where it is proving to be a pest on account of its relationship to honeydew-excreting insects and its painful stings. There seems to be no reason why rochai could not become established in the subtropical parts of the United States and our insular possessions and thus prove as annoying a pest as auropunctata.

Species and subspecies of fleas in North America.--According to a manuscript which is approaching completion, by H. E. Ewing and Irving Fox on the fleas of North America, 61 genera, 14 subgenera, 209 species, and 63 subspecies of Siphonaptera have been reported as occurring on the North American Continent. Over half of these forms have been described from the western part of the United States, an area unusually rich in its flea fauna. It is believed, however, that not more than half of the species of fleas occurring in North America are known.

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FRUIT INSECT INVESTIGATIONS

Dispersion flight of turnip aphid.--While walking to work about 8 a. m. on November 19, 1939, E. A. McGregor, of the Whittier, Calif., laboratory, noticed that the air was filled with myriads of winged aphids which were later determined by P. W. Mason, of the Division of Insect Identification, as the turnip aphid (Rhopalosiphum pseudobrassicae (Davis)). Between 8 and 10 a. m., these insects became increasingly abundant, but almost disappeared during midday. Again, in late afternoon, this dispersion flight became very dense and the climax was reached shortly before sunset, when it was estimated that the average interval between aphids was about 2 feet. On this basis there would be 10,890 insects in each 2-foot stratum over an acre of land. This density seemed to exist as high as the eye could discern the aphids, at least to a height of 50 feet. At this rate, there would be 272,250 insects per 50 feet of air over an acre. In the course of a 3-mile trip (from 3:30 to 4:30 p. m.) these aphids were general throughout the area traversed. To attempt to estimate the numbers of aphids within a few miles of Whittier would result in figures beyond one's power of conception. Again, on December 1, while motoring 2 miles west of Pomona, Mr. McGregor encountered myriads of aphids. This migration was so dense as to impair visibility slightly, especially as the aphids were intercepted on the windshield. Mr. McGregor has observed somewhat similar migratory flights of aphids on one or two previous occasions in central California, but these flights were early in the spring. No such fall movement had ever previously been seen by him.

Parasites of Comstock's mealybug established.--Because of the serious damage being caused by Comstock's mealybug (Pseudococcus comstocki Kuw.), in apple orchards in the Eastern States, the Division of Foreign Parasite Introduction arranged for the importation from Japan of several species of parasites of this pest. These were received at the Moorestown, N. J., laboratory and stocks have been maintained by the oriental fruit moth parasite project at that point. During the summer, liberations of these parasites have been made by G. J. Haeussler, in charge of the Charlottesville, Va., laboratory. Surveys recently made have shown that the most promising parasite of the group, a gregarious form of the genus Allotropa, is well established in several orchards in Virginia and West Virginia. From 1 block of trees in each of which 30 parasitized mealybugs were placed on June 8, 86 mummies per tree were collected on September 3, and these represented only a small proportion of the total number present. Near Martinsburg, W. Va., the mealybugs were found to be 36-percent parasitized by this species 2 months after the initial liberation.

Leafhoppers in vineyards.--Collections made by Perez Simmons, of the Fresno, Calif., laboratory, in Arizona and California in May and June have been identified by P. W. Oman, of the Division of Insect Identification. The dominant species in the San Joaquin Valley, Calif., was Erythroneura elegantula Osb. Several species were found in material taken in vineyards near Phoenix, Ariz., of which the more abundant were Erythroneura variabilis Beam. and Dikraneura cockerelli Gill. Smaller numbers of Empoasca solana Del. and Ollarianus strictus Ball, with a few individuals of several other species, were present.

Ability of Aphelinus mali to spread rapidly.--Evidence of the ability of A. mali (Hald.) to spread into areas adjacent to points of liberation has been collected by E. J. Newcomer, of the Yakima, Wash., laboratory, and will be published soon in the Journal of Economic Entomology. Additional evidence has recently been obtained. The woolly apple aphid was found to be quite scarce in the Kittitas Valley of Washington and to be parasitized by A. mali. This area is about 20 miles from the nearest trees in the Yakima Valley, where the Aphelinus was established about 10 years ago, and so far as known, no artificial introduction of the parasite has been made into the Kittitas Valley. An isolated orchard in a canyon between the Kittitas and Yakima Valleys was also examined, and parasitized woolly aphids were found here also. This orchard is 10 or 12 miles from any other orchard and the parasites undoubtedly became established naturally, as the orchard is neglected and artificial introduction would hardly be made under such circumstances.

MEXICAN FRUITFLY CONTROL

Trapping results show seasonal decrease.--The number of Anastrepha ludens Loew trapped in Texas decreased from 229 during July to only 9 during August, and instead of flies being trapped in 10 districts, as was done in July, they were taken in only 3 districts in August. The 9 flies trapped were submitted for identification early in August and from that time until the close of the month there was nothing to indicate that fruitflies were present in the regulated area by the first of September. This decrease in numbers of fruitflies is a seasonal occurrence and, unless some unforeseen condition arises, the new crop of fruit should reach maturity without great danger of a fall infestation developing. Throughout the entire lower Rio Grande Valley there was a distinct shortage of rainfall and it was necessary to make repeated irrigations to keep the crop in a good growing condition. As a result of the shortage of rainfall, relatively little progress was made in the development of the new crop. Present indications are that there will be no fruit ready for harvesting until very late in September and probably not until October.

CEREAL AND FORAGE INSECT INVESTIGATIONS

European corn borer in early market sweet corn.--The corn borer caused considerable damage in 1940 to early market sweet corn grown in particular sections of New Jersey, Ohio, and Connecticut. C. A. Clark, Moorestown, N. J., reports a definite trend toward increase in corn borer populations in 1940 over those of 1939 in early sweet corn in Burlington County, N. J. As a result of a survey of 29 fields in the county in each of the 2 years, the average number of borers per plant was determined as 5.1 in 1940, as compared with 4.2 in 1939. The 3 fields in New Jersey having the highest infestation in 1940 averaged 16, 14, and 13 borers per plant, respectively. According to A. M. Vance, Toledo, Ohio, infestation by the corn borer in early sweet corn west of Toledo was less in 1940 than in 1939, averaging 5 borers per plant in 1940 and 8.2 in 1939, on the basis of 25 fields surveyed each year. In New Haven County, Conn., an average of 5 borers per plant was found in 25 fields of early sweet corn surveyed in 1940, representing a striking decrease from the unusually high average of 19.8 borers per plant found in a similar number of fields examined in that section in 1939.

Midsummer pupation of European corn borer in early sweet corn.--A. M. Vance, Toledo, Ohio, reports that pupation of the first generation of the corn borer in early sweet corn west of Toledo in 1940 exceeded that observed in any previous year of record and developed later in the season than in 1939. In 18 fields examined August 7-8, an average of 28.4 percent of the larvae had pupated and 3.8 percent of such pupae had produced moths. These figures are comparable with a midsummer pupation of 11.8 percent, accompanied by a moth emergence of 34.1 percent, observed in 25 fields of early sweet corn in the same locality from August 1 to 5, 1939. In 10 of the 18 fields observed in 1940 pupation averaged more than 30 percent, with a maximum of 45.3 percent in 1 field. The relatively high pupation occurring in 1940 may well have been influenced in part by high temperatures at Toledo during the last 13 days of July, for which period the average daily excess temperature, as compared with normal, was 8° F.

JAPANESE BEETLE CONTROL

New can opener speeds up methyl bromide fumigation.--A commercial can opener made especially for the opening of 1-pound cans of methyl bromide has been adopted for use in connection with the fumigation of refrigerator cars in the Pennsylvania Railroad freight yards at Edge Moor, Del. The device consists of a band of spring steel that fits over the can, a 1/8-inch brass nipple 1 inch long, a pointed, hard steel tube sweated into the nipple for piercing the can, a piece of ½-inch rubber tubing, serving as a gasket, and a clamp attachment for forcing the steel tube into the can. The U-shaped copper tubing regularly used with the 15-pound applicator is fastened to the nipple on the can opener and set into the car in the usual manner, so that when a can is pierced the pressure forces the methyl bromide out of the can, thus spraying the contents into the car. It was found necessary to tilt the can toward the pierced end, in order to force all the liquid out. The average time required to empty a can through the size nozzle used is 1 minute. This method of application has many distinct advantages. The cost of methyl bromide in the can is the same as in the large cylinders, but the $10 deposit on each cylinder is eliminated. There is no heavy cylinder to return and there is no expense for charging the cylinder with air. The railroad estimates that they save approximately $25 per day at the Edge Moor yards by eliminating the mechanics required for filling and repairing the applicators. There is a considerable saving of time in fumigating a long string of cars. Finally, use of the cans permits an exact dosage in each car. During August, 29 cars were fumigated by this method in 1½ hours, as compared with the average of 15 to 18 cars per hour with the 15-pound applicator. The 1½ hours of elapsed time included at least ½ hour's delay, owing to a demonstration on the first car and time consumed in adjusting, checking, and testing the applicators. Under ordinary circumstances the 29 cars could have been fumigated in an hour. Several minor adjustments were noted for correction and the correct position of the can necessary for quick and complete emptying of its contents was observed. The railroad officials are satisfied with the results and are well enough acquainted with the procedure to begin next season using the 1-pound cans exclusively.

Fumigation tests with packaged perennials.--A large nursery in Ohio started this month to fumigate perennials in compliance with the Japanese beetle quarantine regulations. In order to facilitate quick handling of their shipping orders, they requested that tests be run to determine the possibility of fumigation of perennial plants in the wrapped packages just prior to mailing. Tests have been made with the perennial plants in their wrappings and placed in open-topped shipping boxes. Most of the closed and sealed packages have a set of air holes at one or both ends of the boxes, plus extra holes punched in the boxes to regulate the amount of ventilation. Tests were made with grubs in packages with varying numbers of holes. No difficulty was encountered in securing the penetration of gas necessary to effect a complete kill of larvae throughout the entire package. The gas apparently penetrates and is retained for a longer period in the package, giving a quicker kill than would ordinarily be obtained with bare-rooted material. It is still necessary for the nursery to determine the effect of the fumigant on the plants, as this retention of gas may have some influence on their growth. If this procedure proves mutually satisfactory it will greatly facilitate the movement of material from this establishment during the spring rush, by eliminating all the tedious handling of small plants to assure that they are free from soil.

Japanese beetle feeding.--Feeding damage was fairly heavy in the Westchester and Long Island, N. Y., areas. On the private estates from which cut flowers were shipped under certification, infestations were general and many of the gardeners set out traps in an attempt to cut down damage to flowering plants. Numerous beetles were removed from cut flowers inspected at these estates. The usual balling of beetles on apples was prevalent in the Bridgeton area of southern New Jersey, while in central Jersey it was reported that crows and blackbirds picking at the ripening fruit were the means of attracting large quantities of beetles that fed on the bruised portion. The birds were therefore indirectly responsible for heavy beetle infestation in some of the apple orchards in the vicinity of Penns Neck, just north of Trenton. Farms in Lancaster County, Pa., reported heavy damage by Japanese beetles to their corn crop. Many growers stated that they would harvest only half a crop. One farmer said that he would not attempt to pick the corn but would turn the entire crop into ensilage.

August fumigation activities.--Fumigation of farm products continued during the month but not on as large a scale as at the beginning of the farm-products-inspection season. Two hundred and eighty refrigerator cars loaded with produce were fumigated with methyl bromide and 2,567 empty refrigerator cars were fumigated with hydrocyanic-acid gas. At Trenton, N. J., 154 cars were fumigated for the Pennsylvania Railroad. Most of these were cars shipped by the Surplus Commodities Commission. The first string of cars at Trenton was fumigated at night under difficult and hazardous conditions. Arrangements were made by the railroad with the Surplus Commodities Commission to fumigate during daylight hours, a more convenient arrangement for all concerned. There was a definite increase in the number of plants fumigated with methyl bromide this month, a total of 125,327 having been so handled. Over 100,000 of these were iris roots. There were no new fumigation chambers constructed during the month, but several nurseries indicated their intention to build chambers in the near future.

Beetle scouting terminated.--Regular scouting of classified nurseries and greenhouses was completed in Delaware on August 17 and on the Eastern Shore of Maryland and Virginia on August 21. Scouting of classified establishments in the Panhandle of West Virginia was completed on August 17 and the scouts were transferred to western Pennsylvania to assist in completion of scouting in that area, so that as much territory as possible could be covered before withdrawal of the scouts paid by the State of Pennsylvania. State men discontinued their scouting in the western part of the State on August 27 and the remainder of the scouting in that section was completed by Federal men. Scouting in the Philadelphia and New York City area continued until August 31. Further scouting in that district was carried on by regular staff inspectors as time permitted in order to complete the scouting schedule, which was delayed somewhat because of rainy weather at the beginning of the season.

Soil treatments at isolated infestations.--Soil treatments in St. Louis, Mo., which were started in July, continued until August 26, a grand total of 17.6 acres being covered in the city. Further treatments there will be made later in the year. At Chicago 2.8 acres was treated on August 30, with the operations continuing into September. Lead arsenate applications in Atlanta, Ga., began on August 14 and 13.6 acres had been covered by the end of the month. Here also the treatments continued into the next month. At Chamblee, Ga., 5.4 acres was treated during August, and at East Point, a suburb of Atlanta, 3.6 acres was treated between August 26 and 31, with additional work to be completed in September. A total of 33.2 acres was treated at these points during the month.

Pittsburgh wholesale dealer in cut flowers starts refrigerator truck delivery.--One of the large wholesalers of cut flowers in Pittsburgh inaugurated during August a refrigerator-truck service from Pittsburgh to florists in outlying cities and towns. Two trucks were loaded at 7 a. m. on Monday, Wednesday, and Friday of each week. The entire loads were inspected and certified, thereby permitting the company's representative to deliver certified cut flowers to classified dealers throughout the tri-State area served from Pittsburgh. Retail trade in the Pittsburgh area was reported as greatly improved. The steel mills there were operating at about 85-percent capacity, the greatest activity since 1929.

Navy Department circularizes naval air fields concerning spread of beetles by airplanes.--At the request of the Secretary of Agriculture, the Acting Secretary of the Navy sent a circular letter to all naval stations within the Japanese beetle regulated area directing that all naval aircraft operating from fields located in the Middle Atlantic States from Norfolk to Connecticut be carefully inspected to assure removal of all Japanese beetles from airplanes prior to taking off. Attention was called to the fact that frequently passengers transport these pests on luggage or other articles. Thorough cooperation with this Department was urged.

Beetle infests imported log on its arrival.--An inspector of the Division of Foreign Plant Quarantines at the Port of New York reported to the New York City Japanese beetle supervisor that on August 14 an adult Japanese beetle was found beneath the bark of a lignum-vitae log from Guatemala. The log had been transported on the deck of a ship that had lain at Quarantine in New York Harbor for about an hour. Beetles were in heavy flight early in August in the Narrows of New York Bay, where the quarantine station is located. Undoubtedly it was at this point that the beetle crawled beneath the bark of the log.

Boat held while refrigerator cars fumigated.--Ordinarily fruits and vegetables traveling via boat do not require certification under the Japanese beetle regulations. However, an exception was encountered during August when an urgent call was received for the fumigation of three refrigerator carloads of potatoes from the heavily infested section of New Jersey to be shipped via sea train to Southern ports. The work was performed under emergency conditions and as soon as the cars were released they were run aboard the sea train and the boat pulled out.

Heavily leaded soil replaced.--A New Jersey nursery started work in August on the removal of 9 inches of top soil from approximately half of their extensive areas treated with lead arsenate. This soil is of high lead arsenate content, owing to repeated applications of this chemical at the rate of 1,500 pounds per acre. These annual applications were far in excess of any required by the Japanese beetle quarantine regulations. This soil is being replaced with virgin top soil obtained from nearby farms.

Gypsy moth certification activities.--More than 2,600,000 board feet of lumber was certified in the Portland, Maine , district for shipment to points outside the generally infested gypsy moth area in August. This was the largest quantity of lumber certified in that section during any month in the past 3 years. Much of this material will be used for crating articles for export. At Brockton, Mass., an egg cluster was removed from a hemlock twig which was to be used on a funeral piece consigned to a point outside the regulated area. Stages of the gypsy moth removed from 57 lots of infested material presented for inspection during August numbered 360 egg clusters, 217 larvae, and 442 pupae.

Records of infested shipments reflect heavier oviposition.--From a total of 117 infested shipments presented for inspection during July and August 1940 there were creosoted and removed 362 egg clusters, 563 larvae, and 589 pupae of the gypsy moth. This compares with 46 egg clusters, 168 larvae, and 129 pupae removed from 31 infested shipments inspected in the same period the preceding year. The egg-laying season of the moth was nearly completed in August, although 1 living gypsy moth pupa was observed in Hartford, Conn., as late as August 30. Reports from district inspectors indicate that there are unusually heavy deposits of egg clusters in southern Maine, central and southern New Hampshire, and central and eastern Massachusetts.

Dutch elm disease infections in isolated areas.--Discovery of additional trees infected with Ceratostomella ulmi in Broome County, N. Y., area extended that area to the north, east, and south. The townships involved in this infection cover about 325 square miles, including the eastern half of Broome County and the northeastern corner of Chenango County. A confirmation near Hancock will extend the area into Delaware County. One tree in Susquehanna County, Pa., above Lanesboro, is also a part of this area. Another Pennsylvania tree in Wayne County, opposite Hancock, may prove to be an extension of the area. With the exception of a group of about 20 infected trees along State Route 235 between Nineveh and Coventry, infected trees in this area are generally scattered. No Scolytus multistriatus Marsh. beetles have been associated with the infection, although there are many dead elms in the area. The Wilkes-Barre, Pa., disease area, on the basis of limited information at this time, shows many contrasts to the Broome County area. The diseased trees are largely located in 1 center in the city, where elms have been weakened by a new dike along the Susquehanna River. S. multistriatus infestations are very heavy in this area and have been found south and west in the Susquehanna Valley. Native elms in this section are generally confined to streams and there are not the numerous dead elms that may be found in Broome County.

Dutch elm disease scouting outside the main area.--During August six confirmations were reported from the outside area--two from Indiana and four from Ohio. In several sections of the Maryland work area there was a noticeable increase this season of S. multistriatus. Throughout the other sections of the work area very few beetles of this species have been found. This trend of beetle infestation pointed to the probability that there was a source farther east from which these beetles were spreading. Advance survey scouting was accordingly started at the Pennsylvania State line and progressed south toward the Potomac River. In this section enough evidence in the nature of old engravings and currently infested material was found in girdled trees to indicate that at least some of the trouble was coming from the suspected section. The first go-over of suspect scouting was completed in the Maryland work area and in the major Athens, Ohio, zone. Scouting in Ohio was slowed up somewhat on the second survey, owing to elms showing considerably more yellowing, caused principally by an extremely dry spell.

Insect damage interferes with Dutch elm disease scouting.--Dutch elm disease scout crews in New York reported that considerable damage was done to elm trees in the work area by Japanese beetles, resulting in as much as 50-percent defoliation in some localities. Much bark-beetle-infested material was also found and tagged in sections of several counties that were not covered by crews removing ice-storm damage. Injury by the elm leaf beetle was so severe in many sections that it was impossible to spot trees infected with the Dutch elm disease. Many of the elms that were fed upon early in the season by elm leaf beetles were putting out their second crop of leaves; however, yellowing of elm foliage was appearing generally throughout the New York work area.

Progress of Dutch elm disease scouting.--The first suspect scouting was completed in New York on August 24 and in Connecticut and New Jersey on August 31. Scouting in Pennsvylania was only 85-percent complete because of the delay in starting W. P. A. men. A large part of the New York disease area had to be removed from the 1940 objective for the first-suspect survey because the Works Progress Administration would not approve scout classification. Although the objective of 3,165 square miles was almost completed, only about half of the entire disease and border-zone-scouting area was scouted for diseased trees.

FOREST INSECT INVESTIGATIONS

Larval disease controls spruce sawfly infestations in southern Vermont and New Hampshire.--P. B. Dowden, New Haven, Conn., reports as follows on the status of the European spruce sawfly in southern Vermont and New Hampshire: "There has been practically no feeding by European spruce sawfly larvae in the Wilmington, Vt., and Dublin, N. H., areas in 1940. First-generation larvae apparently suffered such severe mortality from disease that only a few cocoons were formed. On the outskirts of the former heavily infested areas light deposits of frass have been noted at a few places and small numbers of second-generation larvae may be beaten off the trees."

One introduced pine sawfly suffers in competition with another.--C. L. Griswold, of the Morristown, N. J., laboratory, submits the following note concerning competition between two introduced pine sawflies, Neodiprion sertifer (Geoff.) and Acantholyda erythrocephala (L.), when they occur on the same tree: "In 1939 it was decided to make some observations on the extent of injury suffered by infested trees. Accordingly, 3 isolated plantations of pine located in Mendham Township, N. J., which were infested by both species, were selected in the spring of that year. All trees which had been completely defoliated in 1938 by either or both species were tagged for future observation. Only 27 such trees could be found and, of these, 25 had been defoliated by A. erythrocephala and 2 by N. sertifer. Observations made in the 3 plantations indicated that in 1938 A. erythrocephala was the dominant sawfly species and was widely distributed and responsible for nearly all of the defoliation, and that N. sertifer seemed to have reached tho areas only recently. The 27 tagged trees were subsequently examined in 1939 and 1940 at the end of the larval-feeding period of both sawflies. These examinations revealed that the N. sertifer population increased at a much more rapid rate than did that of A. erythrocephala. The 1940 examination disclosed that the extent and degree of defoliation by N. sertifer was sharply increased, while that of A. erythrocephala showed a correspondingly sharp decrease. This was due principally to the fact that N. sertifer eggs hatch considerably earlier than those of A. erythrocephala, giving the former a distinct advantage when both species occur together and frequently resulting in the starvation of the larvae of A. erythrocephala."

Pales weevil injury to white pine seedlings in hurricane-swept areas.--H. A. Bess, New Haven, Conn., reports as follows on observations made in August to determine the extent of damage to white pine seedlings by the Pales weevil in areas where large numbers of white pines were blown down during the hurricane of September 21, 1938: "A few quantitative data on the injury to natural pine seedlings in hurricane-felled pine stands during 1940 have recently been obtained. In many of these areas 1- to 3-year-old seedlings are fairly abundant and in some small localized spots there are a number of conspicuous dead seedlings resulting from Pales weevil injury. However, these recent examinations indicate that there was comparatively little mortality this year from Pales weevil injury in three of the four areas studied. About one-half of the seedlings examined in the fourth area were dead.

Studies of elm insects as possible vectors of phloem necrosis.--D. E. Parker, Columbus, Ohio, reports that the large number of elms dying from this disease in and around Columbus afford very suitable conditions for the development of large numbers of the small European elm bark beetle (Scolytus multistriatus). Some elms killed by the phloem necrosis disease appear to dry out too rapidly for successful development of a brood of beetles, but many remain in suitable condition and are heavily attacked. Dead and dying trees have not been removed promptly, giving ample opportunity for an increasingly large population of bark beetles. Saperda tridentata Oliv. is commonly found developing in the diseased trees, as are also broods of Magdalis spp.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Gypsy moth infestations reduced by climatic conditions.--Field observations made throughout the spring and summer months in much of the New England area where gypsy moth work is carried on clearly indicate that there has been a heavy mortality of gypsy moth caterpillars since hatching time last spring and, as a result, fewer larvae than normal have reached maturity. Temperatures below freezing prevailed for long periods during the winter months, but it was not sufficiently cold in most localities to cause winter killing of the eggs and the spring hatch was about normal, although the hatching was delayed considerably because of the cold weather. Continued unseasonably low temperatures in May retarded the development of foliage to a marked degree, resulting in a definite scarcity of food for the newly hatched caterpillars. These unusual conditions were augmented by a sudden drop in temperature on June 20, accompanied by a severe frost which necessitated the replanting of many crops, and a fall of snow late in June throughout the mountainous sections of New Hampshire, Vermont, and in several towns in Berkshire County, Mass. These abnormal climatic conditions explain, to a large extent, the heavy mortality of the gypsy moth larvae. The abnormality of the season is exemplified by the fact that scouting crews working in Massachusetts were still finding all stages of the gypsy moth at infestations during the week ended August 24, although only a small number were still in the larval stage.

Gypsy moth work hampered by delay in filling requisitions.--Up to the middle of August it had not been possible to obtain the full force of W. P. A. workers provided in the project applications for the first 8 months of the new fiscal year. Only about 50 percent of the force needed to complete the work program had been assigned in the States of Vermont and New York, and many additional workers were needed in Pennsylvania. Owing to the delay in starting the projects, many of the former gypsy moth employees were assigned to other W. P. A. projects or had found employment in private industry. It is possible that this situation may be somewhat alleviated in the future by the reassignment of some of the former workers to the gypsy moth projects, but the prospect for obtaining a full quota appears slight.

Definite work plans based on early preliminary scouting.--Early in August a small amount of preliminary scouting work was started in several selected townships in the barrier zone section of Connecticut, in order to determine the presence and density of infestation of the gypsy moth in those areas. This work was started early in the season so that a definite plan for intensive scouting and subsequent treatment work could be drawn up by the time the egg deposition had been completed.

Spraying equipment cleaned and reconditioned.--The work of cleaning spraying apparatus used in the States of Vermont, Massachusetts, and New York during the last spraying season was completed early in August at the storehouse in Greenfield, Mass. The men who were employed on this work are now engaged in cleaning, repairing, and redressing oiled hats and coats used in gypsy moth spraying work, and also in assorting and repairing the various field tools used last season so that they may be reconditioned for reissuance or condemned as unfit for further use.

Wet brush piles quickly ignited by the use of waste materials.--An efficient and economical method of burning rain-soaked or snow-covered brush, that can be used wherever a supply of old rags or other waste material of a similar nature is available, has been used for some time in burning brush and forest debris accumulated in the course of selective thinning and cleaning operations by gypsy moth crews. Most of the burlap bands used for trapping gypsy moth caterpillars at infested sites are unfit for further use when they are removed from the trees at the end of the larval season. These bands are stored temporarily for reissuance, together with accumulated old crankcase oil, when the ground conditions become favorable for burning brush. As much of the brush must be burned after rainstorms or snowstorms to eliminate the danger of starting forest fires, it is often difficult to start the brush burning without the use of some inflammable substance. The used burlap soaked in the old oil develops an intense heat which dries the brush sufficiently to start the burning process immediately, when properly placed in the piles. The use of this method of starting fires under adverse conditions has enabled gypsy moth crews to burn the accumulated brush rapidly and efficiently, using materials that would otherwise be discarded.

Scouting work progresses in difficult sections in northern Vermont.--The progress of gypsy moth scouting work in Orleans and Lamoille Counties, Vt., has been slow during the last few weeks, as the crews are working in rough mountainous areas, where the ledgy and precipitious slopes are still littered with a tangle of timber blown down by the 1938 hurricane, and also by dense growths of underbrush. A considerable percentage of the down and lodged trees are still alive, as the roots are only partially torn from the ground. The living treetops, mingled with the understory of shrubs and smaller trees, form an almost impenetrable thicket which is extremely difficult to examine satisfactorily. Blackflies, mosquitoes, and other biting insects, which appear to be particularly abundant this year, added to the discomfort of the workers. As a partial offset to these unfavorable scouting conditions, many of the mountain streams have dried up to such an extent that the crews can easily cross the stream beds. Rainfall in northern Vermont has been very light for several weeks and even the larger streams in the lowlands are abnormally low for this season of the year.

Stowe, Vt., apparently remains uninfested by gypsy moth.--In addition to the intensive examination of all tree growth and ground litter within a wide radius of the tree where a gypsy moth caterpillar was found late in July in Stowe Township, Lamoille County, Vt., approximately 90 burlap bands were attached to trees in that vicinity. The bands were patrolled regularly, but no caterpillars were found beneath them. As the intensive scouting work also produced negative results, it would appear that the caterpillar that was discovered had become established as a result of the wind dispersion in the spring. The discovery of this particular caterpillar was especially important because no gypsy moth infestation had been found in Stowe since 1923.

Burlap bands removed from trees in Vermont.--The patrolling of burlap bands continued until the middle of August in Vermont. Approximately equal numbers of gypsy moth larvae and pupae were being found during the first few days in the month and a marked reduction in the number of larvae found, as compared with previous weeks, was noted during the following week. As the development of the insect had progressed so far by the middle of the month that very few were found beneath the bands, this work was discontinued at most of the infested sites, and the burlap removed from the trees.

Exposed infestation found in Massachusetts near New York State line.--A gypsy moth infestation was located in an exposed site at a high elevation on a mountain ridge in Hancock Township, Berkshire County, Mass., late in August. This infestation overlooks rugged country in nearby New York State, and conditions are particularly favorable for westward wind spread from this point. Every effort will be made to exterminate this infestation when conditions are favorable for treatment work.

Pupal and egg cluster infestations found in Connecticut.--Scouting crews working in the township of Litchfield, Litchfield County, Conn., located several gypsy moth infestations, consisting chiefly of pupae, during the latter part of August. Because of their inconspicuous color, pupal infestations are much more difficult to discern in the dense forests than the buff-colored egg clusters. Crews of laborers engaged in the removal of sprouts and in other ground work at locations found to be infested during the fiscal year 1940 found a small number of new egg clusters. Most of these egg clusters were discovered at infestations where no spraying was done last season.

Sawdust machine disposes of large accumulation of brush.--The sawdust machine developed by this activity, which reduces brush and limbs to sawdust and either blows the sawdust into piles or distributes it over a wide area, is being used in a section of Hartford County, Conn., where 430 piles of brush have accumulated since last spring as a result of gypsy moth thinning work. The machine is able to dispose of only about 20 piles each day, as the brush is largely hardwood, is nearly dry, and contains many large limbs. At the present rate of progress the work in this area will not be completed until the first part of September.

Delay in authorizing W. P. A. work in Pennsylvania reduces benefits expected from banding.--W. P. A. gypsy moth field work, which was suspended at the end of June, was resumed in the Pennsylvania area on August 12, the earliest date possible after authority to commence work was received at this office. Very little benefit will be derived from burlap bands applied to trees in this area last spring, because of the delay in starting this project. Some of the bands were patrolled regularly by N. Y. A. workers detailed to this project and many of the insects were killed by them, but the scope of their operations was limited by the regulation that N. Y. A. workers can be required to walk only 2½ miles from their assembly point to the actual site of the work project. It is extremely unfortunate that all the burlap bands that were applied could not have been turned regularly, especially in an area where eradication work is being done, as this method of control has proved to be very satisfactory in reducing the gypsy moth population in infested territory. There have been numerous instances where complete eradication of the infestation has been accomplished by the use of burlap bands supplemented by the creosoting of the egg clusters. As the female moths have deposited their egg clusters on some of the bands in the Pennsylvania area, extra care must be exercised in the removal of the bands. The egg clusters must be thoroughly creosoted before the bands are removed so that no portions of live broken clusters can fall to the ground, where they would be covered with snow and protected from low winter temperatures.

Heavy defoliation noted in Vermont.--Reports from C. C. C. gypsy moth foremen in Vermont show that heavy defoliation has occurred in areas in the townships of Rockingham, Westminster, Springfield, and Putney. The defoliation in this area ranges from 25 to 100 percent. The caterpillars were present in the field much later in the season than usual and a crew patrolling burlap bands in a Massachusetts town reported finding gypsy moth caterpillars and pupae in the proportion of two pupae to each caterpillar as late as August 13.

C. C. C. gypsy moth work explained to property owners.--In conformity with the C. C. C. policy of soliciting the cooperation of the property owners in gypsy moth control work, late reports from gypsy moth foremen show that a large number of the owners have recently been taken to areas where work was in progress and the methods were explained to them. The property owners always appear interested in the work, and many of them are sufficiently impressed to plan similar work on their own properties. One of these property owners is planning on planting approximately 10 acres with red pine, which is not a favored food plant of the gypsy moth, at the site of one of the gypsy moth infestations where selective thinning work has been done by the C. C. C.

PLANT DISEASE CONTROL

1940 season unfavorable for rust spread in sugar pine region.--Scouting results thus far this season have been negative aside from the pine infections found in several places where Ribes infections were heavy 2 years ago. An important development was the discovery of two infected sugar pines along Bailey Creek near Viola, on the Lassen National Forest. The pines were located in the general vicinity of the Ribes infections found there in 1938 and were found by H. G. Lachmund. This infection places the southern known limits of pine infection in California approximately 107 miles south of the Oregon border. Judging from negative scouting results to date insofar as new infections on Ribes are concerned, this year, like last, is unfavorable for long-distance spread of infection from the pine infection centers in the North. Although the scouts have located numerous rust infections on Ribes, all thus far have been identified by the Division of Forest Pathology as pinyon rust. Infections of pinyon rust on Ribes seem to be unusually well developed and distributed this year. Eradication crews on the Eldorado National Forest are turning in an abundance of Ribes infected with this rust. In view of the negative scouting results, plus the fact that Ribes defoliation is already becoming pronounced, it is planned to terminate the scouting season by the end of September.

New blister rust control film.--Field work has just been completed in obtaining motion pictures of various phases of blister rust and its control in the Northeastern States. Both black-and-white and colored films were used in taking the 247 scenes. A sound track with narration will be added at Washington. When completed the picture will be issued by the Extension Service of the Department.

Ribes curvatum susceptible to blister rust.--A recent examination by H. E. Yost of an experimental planting of Ribes curvatum near Deep Creek Lake in western Maryland showed heavy infection, thus proving conclusively that this species is susceptible to the white pine blister rust. The test was made because R. curvatum, being native in the southern Cumberland Mountains, had never before been exposed to natural infection out of doors, although it had proved susceptible in greenhouse tests. These bushes were somewhat slower in leafing out than were the native R. rotundifolium, owing to their having been heeled in for some time prior to planting. At least 95 percent of the leaves on these bushes showed blister rust in either the telial or uredinial stages. A few of the rather heavily infected leaves were dying. Many of the nearby R. rotundifolium bushes were practically defoliated because of the extremely heavy infection. Earlier in the season the infection on the R. curvatum plants, caused by aeciospores, was fairly light, as they did not leaf out until toward the end of the period during which aeciospores are produced. This species appears to be highly susceptible to urediospores, since the leaves which appeared on the new growth were heavily infected. Many of these bushes made excellent growth during the summer, in some cases up to 1 foot of new wood. The trial plants are being destroyed before they have an opportunity to fruit, to avoid danger of their becoming established in Maryland.

Severe damage to merchantable-sized white pine at Tupper Lake.--Harry Holcomb, district blister rust control leader at Malone, N. Y., recently reported that merchantable-sized white pine in a 7½-acre stand at Tupper Lake, N. Y., had been damaged severely by blister rust. About three-fourths of the trees are infected with stem cankers and many large pines are dying or dead. Discolored and dead tops are very conspicuous. Most of the cankers are high up on the trunks, which for the most part are free of lower branches. The infection was apparently spread by skunk currants. It is planned to make a damage study in this area.

Fungus causing defoliation of ribes identified.--A fungus which has been causing defoliation of skunk currants in Worcester County, Mass., has been identified by Perley Spaulding as Pseudopeziza ribis. This fungus apparently is not new, but it is causing premature defoliation and was noted as early as the last week in July.

First report of blister rust in five West Virginia counties.--Extensive scouting was carried on in West Virginia in August for blister rust and the disease was found on wild and cultivated Ribes in the uredinial and telial stages in 4 counties--Grant, Mineral, Morgan, and Berkeley--and on both Ribes and white pine in Hampshire County. The infection on Ribes in most cases was light, the species infected being R. cynosbati, R. rotundifolium, R. aureum, and R. grossularia. In Hampshire County, out of about 15 to 20 young white pine trees examined, only 1 was found to be infected. The only canker found appeared to be of 1934 origin. No blister rust infection, either on Ribes or white pine, has previously been reported in the above-mentioned counties.

COTTON INSECT INVESTIGATIONS

Early destruction of cotton stalks reduces boll weevil population.--The cotton stalks throughout the lower Rio Grande Valley were destroyed early in 1939 as part of the control program against the pink bollworm. In general, the fields in the Brownsville area, on this side of the river, were cleaned up earlier than the fields in the Matamoros area in Mexico. R. L. McGarr and F. F. Bibby examined cotton last May to determine the effect on the boll weevil population of early destruction of cotton stalks in 1939. The boll weevil infestation was low in both areas and many fields on both sides of the river showed no boll weevil infestation. On the Brownsville side the examination of 19,200 squares in 116 fields gave an average infestation of 1.34 percent, while on the Mexican side, where the stalks were not destroyed quite so early last fall, the examination of 18,000 squares in 109 fields gave an average infestation of 3.62 percent. The highest infestations found on the American side during each of 5 successive weeks ending May 4, 11, 18, and 25 and June 1 was 5.0, 4.5, 4.0, 3.5, and 16.5 percent, while on the Mexican side of the river the highest infestations for these 5 weeks were 10.0, 26.5, 28.0, 19.0, and 25.5 percent. Average highest weekly infestation on this side of the river for 5 weeks was 6.7 percent, while on the Mexican side it was 21.8 percent. In contrast with these low boll weevil infestations in 1940, records made in this area by the Division of Pink Bollworm and Thurberia Weevil Control in March 1939 show that on the American side the inspection of 17,824 fruiting forms showed a boll weevil infestation of 20 percent and on the Mexican side the examination of 9,714 forms showed that 33 percent were infested. Although the season is several weeks later this year than in 1939, these studies emphasize the value of early fall destruction of cotton stalks as a means of boll weevil control.

Mixtures of calcium arsenate and nicotine sulfate for boll weevil and cotton aphid control.--K. P. Ewing and assistants at Waco, Tex., report that in 1 of the boll weevil-aphid control experiments the aphid infestation was high enough to give interesting results. The plots used were 1/18-acre in size and were arranged in randomized blocks with 4 replications of each treatment as follows: (1) Check (untreated); (2) calcium arsenate; (3) calcium arsenate plus 0.5 percent nicotine sulfate; (4) calcium arsenate plus 1.0 percent nicotine sulfate. Each treated plot received eight applications of dust, averaging slightly less than 6 pounds per acre-application. Although there was never a damaging infestation of aphids in any of the plots, for the first 2 weeks in August the population ranged from 11 to 14 aphids per square inch in the calcium arsenate treated plots of blocks 1 and 2. A comparison of the average aphid infestation in the different treatments of blocks 1 and 2 at the peak period of the infestation, on August 6 and 13, is as follows:

Treatment	Average aphids per square inch
	Number
Calcium arsenate	12.64
Calcium arsenate plus 0.5 percent nicotine sulfate	3.67
Calcium arsenate plus 1.0 percent nicotine sulfate	.31
Check	.13

These records show 3.4 times as many aphids in the calcium arsenate treated plots as in the plots treated with calcium arsenate plus 0.5 percent nicotine sulfate and 40 times as many in the calcium arsenate treated plots as in the plots treated with calcium arsenate plus 1.0 percent nicotine sulfate. These records show definitely that in this particular experiment 0.5 percent nicotine sulfate gave good control or held the aphids well below the damage point and that there were practically no aphids in the plots treated with 1.0 percent nicotine sulfate. In view of the fact that the aphid infestation in the calcium arsenate treated plots did not quite reach the damage point, average maximum of only 12.64 aphids per square inch during a 2-week period, and that only 1 such experiment was conducted, the results would not justify definite conclusions. Results of the experiment do, however, indicate what might be expected from similar treatments conducted on a larger scale, and they do bring to light certain important questions that must be investigated.

Dusting versus spraying for boll weevil control.--K. P. Ewing and seasonal assistants at Waco report regarding three sets of experiments for boll weevil control, conducted in Limestone County, Tex. In each experiment four plots (2 acres per plot) received the following treatment: (1) Check (untreated); (2) calcium arsenate dust, 7 to 8 pounds per acre; (3) calcium arsenate spray, 7 to 8 pounds per acre; (4) lead arsenate spray, 2.5 pounds per acre. The poisoned plots in each experiment received five effective applications at about 5-day intervals between July 9 and July 31. The dust applications were made between daylight and 8 a. m. The spray applications were made later on the same days. The accompanying table summarizes the average boll weevil infestation records made in each plot on July 8 (before poison was applied), and on July 15, 22, 29, and August 7, and the bloom counts made on July 25, August 1, and August 7. From the infestation records and bloom counts, it is evident that calcium arsenate dust gave much better control than either of the sprays, with calcium arsenate spray in second place. These results were obtained in fields where boll weevils were abundant and other insects caused little or no damage. In some plots nearly 80 percent of the squares were infested.

Treatment	Average boll infestation: On July 8 (before poisoning)	Average boll infestation: On July 15, 22, 29, and August 7 (after poisoning)	Average blooms per acre (July 25, August 1, and August 7)
	Percent	Percent	Number
Calcium arsenate dust	14.3	8.7	4,448.8
Lead arsenate spray	14.3	44.9	1,646.6
Calcium arsenate spray	15.8	32.5	2,293.6
Untreated check	14.4	59.4	1,151.9

The cotton in these experimental plots has not been picked but the results will be quite different from those obtained in 1939 in a similar series of experiments in the presence of a very light boll weevil infestation in Limestone County. Last year in three experiments lead arsenate applied as a spray at the rate of 2.5 pounds per acre under a pressure of 300 pounds in a machine with three nozzles per row gave an average increase over the untreated cotton of 155 pounds of seed cotton per acre, or 30 percent gain, while adjoining plots dusted with calcium arsenate at the rate of 7 to 8 pounds per acre produced a gain of only 31 pounds, or 6 percent.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Gin-trash inspection.--Toward the end of August, 25 crews were inspecting gin trash in southern Texas and adjacent areas in Mexico. No new areas were found infested in the United States but a light infestation was discovered in Mexico at Nuevo Laredo, in the State of Tamaulipas, this being the first pink bollworms ever found at that point. Generally speaking, the infestation in south Texas seems to be lighter than in 1939. In Cameron County as a whole, infestation built up to about the same degree as last year, but later in the season. In the vicinity of Brownsville, where a comparatively heavy infestation existed in 1939, very few pink bollworms were found. There seemed to be an increase in the infestation in the eastern part of Hidalgo County over last year, but little change in Willacy and Starr Counties. In Duval, Jim Hogg, and Brooks Counties a few specimens were taken, but not as many as last year; however, an increase was found in Maverick County. At the end of August no pink bollworms had been found in Nueces, Jim Wells, and Kleberg Counties, all of which were known to be infested in 1938 and 1939. In the lower Rio Grande Valley of Mexico a much lighter infestation was found in the Matamoros area, but there seemed to be some increase in the Reynosa section. There appeared to be no particular change in the status of infestation at Anahuac, Nuevo Leon, Mexico.

Subsoil cotton-stalk cutter.--It has been demonstrated that the cost of killing cotton plants in the lower Rio Grande Valley subtropical area, looking to the eradication of the pink bollworm, can be reduced approximately half by the invention by this Division of a subsoil stalk cutter. It is extremely difficult to kill cotton stalks in this area, on account of the tendency of the stubs to sprout and on account of leaving some of the roots of the plant uncut in the plowing operation. This implement is made to be attached to an ordinary two-horse turning plow, to a Georgia-stock, or behind a tractor. It cuts underground at any convenient depth, severing all roots of the plant without otherwise disturbing the ground, leaving the cut-off tap roots well covered with soil. Tests made with this cotton-stalk cutter have shown it to be successful.

Situation in the Big Bend.--Prior to 1938, pink bollworm infestation had built up to such an extent in the Big Bend area that more than half of the cotton crop was being destroyed. A control program put into effect in that area for 1938 and 1939, calling for field clean-up, delayed planting, and elimination of early fruiting sprout cotton, in addition to the usual sanitary measures, combined with flood conditions over large areas the preceding fall, reduced the infestation to such an extent that no commercial damage was present in the 1939 crop. Sufficient observations have been made in 1940 to determine that there will be no commercial damage this year, though this may be partly attributed to weather adverse to pink bollworm development in May 1940.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

White-oil emulsion more effective than sulfonated castor oil as spreader for derris-pyrethrum spray against red spider.--C. A. Weigel and George V. Johnson, of the Beltsville, Md., laboratory, reported the results of small-scale toxicity tests against Tetranychus bimaculatus Harv. on potted cucumber seedlings. The tests were designed to determine whether certain spreaders could be substituted for sulfonated castor oil in the derris-pyrethrum-sulfonated castor oil spray without reducing the effectiveness of the spray combination against this pest. The test plants were uniformly treated by spraying both sides of all leaves with a small atomizing electric sprayer held at a distance of 15 feet from the leaves during application. In all derris-pyrethrum spray mixtures tested the concentration was 0.0056 percent of rotenone and 0.01 percent of pyrethrins, while the derris spray alone contained 0.0056 percent of rotenone. All mortality counts of red spiders were made 2 days after treatment. The mortality of red spiders ranged from 71.9 to 100 percent for the 11 spray combinations used in the tests. Both the derris spray and the derris-pyrethrum spray, to which had been added white-oil emulsion, 1-100 by weight, gave 100-percent mortality of the spiders, as compared to 82.2 and 83 percent from derris-pyrethrum sprays to which had been added sulfonated castor oil at the rates of 1-300 and 1-400 by volume, respectively. Water sprays containing only the white oil emulsion at concentrations of 1-100 and 1-200 by weight resulted in mortalities of 97.3 and 92.1 percent, respectively. A derris-pyrethrum spray containing sodium oleyl sulfate 1-1,000 by volume gave a mortality of 78.7 percent, while one containing the sodium oleyl sulfate plus synthetic resins, 1-1,000 by volume, gave 87.6 mortality. Another derris-pyrethrum spray containing sodium lauryl sulfate, 1-3,000 by weight, resulted in a mortality of 71.9 percent. For the same period of observation there was an average mortality of 5.3 percent of the red spiders on untreated cucumber seedlings and 23.3 percent on plants sprayed with plain water. From these results it would appear that the white oil emulsion 1-100 by weight was considerably more effective than sulfonated castor oil 1-300 or 1-400 in the derris-pyrethrum spray. The white-oil emulsion alone, 1-100 or 1-200 by weight, was very effective against the spiders. There was probably little, if any, real difference between the effectiveness of sodium oleyl sulfate 1-1,000 by volume, sodium oleyl sulfate plus synthetic resins 1-1,000 by volume, sodium lauryl sulfate 1-3,000 by weight, and sulfonated castor oil 1-300 or 1-400 by volume, in the rotenone-pyrethrum spray.

Moisture more important than temperature in determining injury to mushrooms from fumigation with hydrocyanic-acid gas.--From experiments designed to control the mushroom and manure flies (Sciara and Megaselia), A. C. Davis, Beltsville, reports that damage to mushrooms by hydrocyanic-acid gas generated from calcium cyanide is apparently influenced more by moisture than by temperature. To test this the mushroom house was watered and fumigated, using calcium cyanide at a rate of 3 ounces to 1,000 cubic feet. This gave a peak concentration of 0.324 mg./l, resulting in severe burning to the mushrooms. When the house was drier other fumigations at the same dosage resulted in no injury to the mushrooms. During these tests the temperature of the air at the bottom of the mushroom house and of the bottom beds ranged from 51° to 55° F., while temperature in the top beds of mushrooms and at the top of the house ranged from 54° to 61°. Even with the range in temperature of 51° to 61°, no difference in the effect of the gas upon mushrooms could be detected between the top and bottom beds. Therefore it would appear that the more important factor in determining damage to the mushrooms during fumigation is moisture, rather than temperature.

Serpentine leaf miner in gerbera controlled with methyl bromide.--A series of experiments conducted by F. S. Blanton, of the Babylon, N. Y., laboratory, has shown methyl bromide to be an effective fumigant against Agromyza pusilla (Meig.) attacking many varieties of gerbera. In preliminary tests 100-percent mortality of the leaf miner larvae was obtained by exposing infested leaves of gerbera to concentrations of 2 pounds per 1,000 cubic feet for a period of 2 hours or 3/4 pound per 1,000 cubic feet for 4 hours, with the temperature about or slightly above 70° F. At the same temperature practically 100-percent mortality of the larvae was obtained by exposing the infested leaves for 12 hours to concentrations of 1/4 or 5/16 pound of methyl bromide per 1,000 cubic feet. Other tests made so as to approximate commercial application of this fumigant disclosed that concentrations as low as 5/16 pound of the methyl bromide per 1,000 cubic feet, with an exposure of 12 hours, gave 100-percent mortality of the larvae infesting leaves that were tightly packed together in the bottom tray of the fumigator. Similar concentrations of this fumigant were equally effective against the eggs of the leaf miner. Little is known concerning the tolerance of gerbera plants to this fumigant, but it appears that the gas may be used effectively at the time of transplanting.

Infestation of cane maggot in youngberries and loganberries.--W. W. Baker and S. E. Crumb, Jr., of the Puyallup, Wash., laboratory, report having observed during June an unusual infestation of a cane maggot, Phorbia sp., in youngberries and loganberries in the Horsehead Bay district, Pierce County, Wash. Typical damage by the cane borer Phorbia rubrivosa Coq. is considered to appear first when the young cane shoots are about 12 to 18 inches tall and is usually consummated about June 1. In the Horsehead Bay area examination of the infestation disclosed not only the presence of pupae as would be expected in the case of P. rubrivosa, but also larvae of varying ages, some quite small. The points of injury on the canes indicated that the flies had been active for several weeks, beginning perhaps about the middle of April or soon after. In a short row of youngberries the flies had apparently not killed as many shoots as in the loganberries, but had galled a number of the youngberries from 5 to 8 inches above the soil surface. In the loganberries these galls were from 1 to 3 feet above the soil and the wilted tips were more prevalent on this plant than on youngberries. Another unusual feature, the loganberries had as many as three infestations on individual plants. An inspection of nearby native berry host plants and a few escaped evergreen blackberries failed to disclose a single one infested. Records indicated that this apparently localized infestation had persisted for about 8 or 9 years, despite attempts to control it by carefully pruning the berries and although there seemed to be no reservoir of native plants close by to supply flies each year. However, neglected fields may supply these flies if their flight range is considerable. Investigations are now being made to determine the species of Phorbia responsible for the damage.

Tobacco plants injured by poisoned baits.--Tests conducted by F. S. Chamberlin, of the Quincy, Fla., laboratory, to determine the severity of plant injury caused by several poisoned baits when applied to tobacco in plant beds, disclosed that foliage burn resulting from a bait containing calcium arsenate was much less than that from one containing an equal amount of paris green. The formula used consisted of 5 pounds cottonseed meal, 5 pounds wheat bran, 2 quarts molasses and water (1-10), and ½ pound calcium arsenate or paris green. Similar comparisons with a bait containing ½ pound of paris green and ½ pound of hydrated lime showed that less injury resulted from the application of this bait than that from the one containing the paris green only, but more than that from the one containing calcium arsenate.

INSECTS AFFECTING MAN AND ANIMALS

Combination screwworm larvicides and wound protectors.--Approximately 50 remedies combining both larvicidal and wound-protective properties were tested during the month by Roy Melvin and C. L. Smith, of the Menard, Tex., laboratory. Of these, 12 have given very promising results in incompleted preliminary field tests. Three remedies gave 5 days' initial protection, 5 gave 6 days' protection, 2 gave 7 days' protection, 1 gave 8 days' protection, and 1 gave 9 days' protection on large bloody cattle wounds against all species of flies.

Egg-laying habits of Tabanus abactor.--W. L. Barrett, Jr., of the Uvalde, Tex., laboratory, while commenting on the fact that the egg-laying habits of T. abactor Phil. are unknown, states that he has observed for the second time that the eggs were laid in a loose mass and fell apart single when disturbed. The eggs were not stuck together in the typical type of the Tabanus spp. cluster. Mr. Barrett obtained the eggs from one of seven females placed in a screen-wire cage in which was placed a piece of moist cotton. They were oviposited under the cotton.

Amount of blood engorged by horn flies.--Interesting data on the average amount of blood taken by individual flies, Haematobia irritans L., and the total amount of blood lost by a herd of cattle because of these flies, were submitted by W. G. Bruce, of the Dallas, Tex., laboratory. It was found that an average meal of blood of each horn fly was from 1.04 to 2.19 mg. and that 2 meals were taken daily. Using these data, Mr. Bruce estimated that on 1 ranch near Cresson, Tex., where there are 500 head of cattle with a normal infestation of approximately 4,000 horn flies per head, 7 quarts of blood were lost daily. At that rate, a rough estimate would be 312 gallons, or 2,713 pounds of blood lost in a year's time by this herd of cattle.

Trapping horn flies.--Data obtained by Mr. Bruce indicate a marked reduction in number of horn flies where cattle fly traps have been installed. Cattle in a trapped pasture averaged 100 flies per head, whereas cattle in untrapped pastures averaged over 1,000 flies per head. The percentage of each species of flies, as determined by a sample of 500 flies taken from a cattle fly trap, was as follows:

Species	Percent
Haematobia irritans L----------	96.6
Stomoxys calcitrans (L.)------	1.4
Sarcophaga spp-----------------	.6
Cochliomyia macellaria (F.)---	.8
Lucilia spp--------------------	.2
Cryptolucilia spp--------------	.4

Developmental periods of sand flies.--J. B. Hull, of the St. Lucie, Fla., laboratory, states that the developmental period of sand flies, Culicoides furens Poey, was found to range from 30 to 148 days.

Flight range of sand flies.--A light trap set up by Mr. Hull 4½ miles from a sand fly breeding place failed to attract any sand flies.

Breeding places of dog fly.--W. E. Dove, of the Panama City, Fla., laboratory, reports that extensive and intensive observations by five men in August show that the dog fly, Stomoxys calcitrans, breeds primarily in fermenting marine grasses, Halodule and Thalassia, deposited by tides on the bays.

Mosquito larvicides.--According to latest tests on mosquito larvicides by W. V. King, Orlando, Fla., phenothiazine in penetrol and acetone was more toxic to Culex pupae than other combinations of wetting agents with phenothiazine. Also, phenothiazine appeared more toxic than the promising Azo compounds when used on Aegypti larvae.

Mosquito survey in Yakima Valley.--At the request of health officers and sanitary engineers in and around Yakima, Wash., E. F. Knipling and C. M. Gjullin made a survey of the mosquito situation late in August to determine the status of the mosquito species at that point. The species taken included Aedes vexans Meig., A. lateralis Meig., A. dorsalis Meig., Culex pipiens Linn., C. tarsalis Coq., Theobaldia inornata Will., and Anopheles maculipennis Meig. The request was prompted by the alarming number of cases of human encephalitis. A total of 41 cases in man, resulting in 9 deaths, have been reported in that area this season. The number of cases of equine encephalomyelitis has been relatively low, however. As only 12 such cases have been reported in horses, the low incidence is probably due largely to an intensive number of inoculations.

FOREIGN PLANT QUARANTINES

Excess airplane passengers.--More than one hundred excess passengers in the form of fruitflies were found on August 13 at New York when Customs Inspector Adams called attention to a paper carton of fruit among the baggage from the seaplane Dixie Clipper. The fruit left from a basketful sent aboard at the Azores as a present to one of the passengers, consisted of 143 figs from which 119 live larvae of Ceratitis capitata (Wied.) were taken, 4 pounds of grapes from which 2 larvae were taken, 75 Passiflora edulis, 2 pineapples, and 96 plums. Part of the passion fruit was infected with a fungus tentatively determined as Phoma sp.

Avocado disease.--An avocado from Nicaragua, found in a ship's quarters at New Orleans on August 23, bore small groups of tiny protuberances, some of which had blackish specks on or near their tops. Microscopic examination disclosed that the specks were due to a Cercospora sp., probably undescribed, which was sporulating abundantly. Very few of the lesions were sufficiently mature to sporulate. It is probable that this disease has been intercepted before in the immature state. The Cercospora sp. reported on Florida avocado leaves might be the same species. Additional material of this form on the fruit is desired for study by the specialists.

New nematodes described.--The Proceedings of the Helminthological Society of Washington for July (received in September) contains two papers by Jonas L. Bassen, inspector at New York, entitled, "Rhabditis chitwoodi, n. sp., a Nematode Found in Diseased Sagittaria Corms, with Remarks on Rhabditis conica (Reiter) n. comb." (Helminthol. Soc. Wash. Proc. 7:98-101, July 1940) and, "Panagrolaimus hygrophilus, n. sp., a Nematode Found in Decayed Tubers of the Waterlily Root, Nelumbium nucifera Gaertn." (ibid. 7:101-3). The new species of Rhabditis was found in Sagittaria corms (from Wisconsin) being inspected for export certification. The Panagrolaimus was found in an internal wet rot of waterlily roots in cargo from Cuba.

Entomological interceptions of interest.--Carnation flowers found on August 2, 1940, in crew's quarters of the S. S. Exochorda from Europe at New York, were infested with the thrips Haplothrips cottei (Vuillet). This represents our first interception of this species, which is a pest of carnations in Egypt and southern France. Four living adults of the mango weevil (Sternochetus mangiferae (F.)) were intercepted at San Pedro, Calif., on

July 8 in mango seed in baggage from Hawaii. Living larvae and pupae of the West Indian sweetpotato weevil (Euscepes postfasciatus (Fairm.)) were found at Baltimore, Md., in sweetpotato in stores on July 26 from the Virgin Islands. Specimens of the coccid Asterolecanium aureum (Bdv.) were taken at Hoboken, N. J., on August 20 on a leaf of Cattleya sp. in cargo from Venezuela. Fifty-three living larvae and one pupa of the pink bollworm (Pectinophora gossypiella (Saund.)) were intercepted at Philadelphia, Pa., on July 25 in cotton bolls in mail from Argentina. Living specimens of the mirid Sixeonotus areolatus Kngt. were found at Eagle Pass., Tex., on July 11 on lettuce in baggage from Mexico. A living specimen of the lygaeid Clerada apicornis Sign. was intercepted at Hoboken, N. J., on July 13 on wild Cattleya sp. in cargo from Colombia. Specimens of the coffee-berry borer (Stephanoderes hampei Ferr.) were taken in coffee berries at New York on July 11 in cargo from Angola and on July 15 in cargo from Ethiopia. The coccid Matsucoccus matsumurae (Kuw.) was intercepted in passenger's baggage at Seattle, Wash., on April 29, 1940, on dwarf pine plants from Japan arriving on the Hikawa Maru. Two living and one dead specimens of the cerambycid Penichroa fasciata Steph. were found at New York on July 19 in wooden hoops on a barrel in cargo from Spain. A living adult and pupa of the cerambycid Phormesium virgulatum Bates were intercepted at New Orleans, La., on July 5 in Cassia fistula seed pod in baggage from Honduras. Six living adults of the scolytid Leperisinus fraxini (Panz.) were found at New York on August 2 under the bark of ash wood used as crating in cargo from England.

Pathological interceptions of interest.--Citrus canker (Bacterium citri (Hasse) Doidge) was taken on July 5 at Boston on sour limes in stores from Java. It is stated that half of the 143 fruits were infected. Ceratophorum setosum Kirchner was intercepted July 30 and again on August 8 at New York on Erythroxylon coca leaves in cargo from Peru. Colletotrichum orchidearum All. was intercepted on Dendrobium chrysotoxum from Thailand on February 6, on Fernandezia (Lockhartia) lutea from Guatemala on February 28, and on Trichopilia tortilis from Mexico on March 12, all on plants offered for entry under special permit at San Francisco. Didymosporium sp. was found on May 29 at Washington on Dombeya sp. in a special-permit mail shipment from Cuba. Gloeosporium sp., no species reported on the host genus, was found on February 28 at San Francisco on Trichopilia tortilis plants in cargo from Guatemala. Graphiola sp. (cf. G. cylindrospora) was found on July 15 at Philadelphia on palm leaf packing for palm leaf fans from China. Melampsora medusae Thuem. (inadequate material and determination somewhat doubtful) was found on February 7 at New York on 3 Populus sp. leaves in the excelsior packing for nectarines in cargo from Chile. Mycosphaerella sp. (spores too short for M. caricae Syd.) was found on January 10 at New York on papaya fruits in stores from Cuba. Phyllosticta sp. (cf. P. allii Tehon and Daniels) was taken August 3 at El Paso on onion bulbs in baggage from Mexico. Phyllosticta sp., no species reported on the host, was found on April 10 at New York on Lawsonia inermis leaves in cargo from Anglo-Egyptian Sudan. Phyllosticta sp., which does not agree with any described species, was found at New York on December 29, 1939 on Fraxinus ornus seed from Italy. Puccinia urbaniana P. Henn. was found on Valerianodes jamaicensis leaves in baggage from Puerto Rico on August 12 at New York. A Puccinia sp. which does not agree with either P. phragmitis (Schum.) Korn. or P. magnusiana Korn. was taken on June 22 at Nogales on Phragmites communis among wild grasses in cargo from Mexico.

DOMESTIC PLANT QUARANTINES

Grasshopper and Mormon cricket control work.--Adult surveys in both the grasshopper and Mormon cricket infested areas were completed in August and the egg surveys of the crickets were practically finished by the close of the month. In preparation for the survey of grasshopper eggs, schools of instruction for control supervisors are scheduled as follows: Great Falls, Mont., August 30-31; Fargo, N. Dak., September 5-6; Yankton, S. Dak., September 12-13; Lamar, Colo., September 17-18. There were no Bureau-paid control operations in August, all such work having been terminated late in July. Farmer baiting in most of the crop-'hopper areas had ceased by the close of August. In some areas where infestations of nymphs of the lesser migratory 'hoppers are expected in young wheat, the mixing stations are continuing operations. Control measures were still going forward at the close of August in several counties in Utah where an excellent outlook for alfalfa seed is encouraging the growers to continue baiting and in the northern Red River Valley of Minnesota where continued sporadic local migrations occur. Completion of work in Crook and Sheridan Counties, Wyo., in the week ended August 10 wound up the season's control work in the Mormon cricket infested States.

Governor appoints white-fringed beetle control committee.--To consider the problems of white-fringed beetle control in the vicinity of New Orleans, a conference was held with the Governor of the State on August 9, attended by beekeepers and certain others affected by the operations and by State and Federal representatives. The Governor later appointed a committee to study the activities of the control program.

White-fringed beetle quarantine restrictions modified.--Intensive control work on the white-fringed beetle infestations during the last few years have so reduced beetle populations that the Federal quarantine regulations have been further modified to lift all restrictions on the movement from any part of the regulated area of cotton lint, baled or unbaled, and also on cottonseed when free from gin trash. Sanitation practices at the cotton gins are required to be maintained. This modification was made effective August 9, 1940, by a revision of circular B. E. P. Q. 485.

Sweetpotato weevil inspection in Louisiana.--At the request of the Louisiana State entomologist, a cooperative survey of the sweetpotato weevil is being made in northern Louisiana. Considerable assistance is being given by the county agents in locating the areas in which sweetpotatoes are grown more extensively. A similar survey was conducted several years ago in this part of the State without finding sweetpotato weevils.

Phony peach and peach mosaic inspection.--Phony peach and peach mosaic inspection was rapidly nearing completion for the current year in most areas during August. Inspections were conducted in Alabama, Arkansas, California, Colorado, Georgia, Louisiana, New Mexico, Mississippi, South Carolina, Texas, and one small area in Utah. During the latter part of the month predefoliation inspections of nursery stock were begun in the mosaic infected States in accordance with the provisions of the standard State quarantines.

Peach mosaic work in Arizona.--All mosaic infected trees have been removed from the Beaver Creek District in Yavapai County, and a considerable number of new orchards are being planted in the district. The cooperation of growers in Arizona is constantly improving and should greatly increase the effectiveness of control operations.

Citrus canker eradication.--Operations on the citrus canker eradication project were limited during August to inspection work. Five Bureau inspectors examined dooryard trees in the towns of Pharr, San Benito, and Mission, Tex., as part of a precautionary resurvey of the old plantings throughout the lower Rio Grande Valley, where the canker appeared in the early stages of eradication operations. No infection has been discovered in the valley since 1922. Over 14,000 trees on 1,300 properties were inspected in August.

Transit-inspection activities.--The movement of produce cars from the area of heavy flight in the Japanese beetle regulated area to midwestern points dropped off considerably in August, as evidenced by the number of cars inspected in Chicago, which fell from a total of 192 in July to 29 in August. The inspector at Boston made an interception of plants in soil in a package labeled "flowers" moving in violation of both the Japanese beetle and gypsy moth quarantines. At Philadelphia inspection was made of a shipment of scrap iron moving from New Orleans by boat.

Railroad cooperation.--The excellent cooperation received from freight representatives by the inspector at Atlanta is worthy of special comment. These railroad officials have requested their employees to place on the train sheets the numbers of Federal certificates covering shipments of quarantined articles and to make available to the inspector the "passing records" of carlots of freight moving through Atlanta. This enables the inspector to make a quick and efficient check of an enormous amount of material moving via freight in carload lots.

CONTROL INVESTIGATIONS

Toxicity and repellency of paris green affected by particle size.--E. R. McGovran and E. L. Mayer, of this Division, and C. C. Cassil, of the Division of Insecticide Investigations, report that the toxicity and repellency of paris green to the Mexican bean beetle is influenced by the particle size of the insecticide. Mr. Cassil, who prepared the three fractions of paris green, removed the fine particles from the coarser fractions by controlled sedimentation and decantation in ethyl alcohol after these fractions had first been separated by the usual sieving procedure. Most insecticidal dusts, even when considered to be coarse, contain considerable fine material which probably has a marked effect on their toxicity. The finest fraction was separated out by a Federal air classifier. Under field conditions paris green is very toxic to bean foliage but under the laboratory conditions of these tests, where spray and dusts were applied only to the upper surface of the leaves and the spray dried in 5 minutes or less, no appreciable injury became evident during the 48 hours the beetles were allowed to feed on the treated foliage. These laboratory tests showed that paris green particles with an average diameter of 1.1 microns caused the highest mortality among the insects and permitted the least feeding, when applied to bean foliage either as a spray or a dust. The 12 micron particles caused an intermediate percentage of mortality and degree of feeding and the 22 micron fraction caused the lowest mortality and permitted the largest amount of feeding.

INSECTICIDE INVESTIGATIONS

Variations in melting point of toxicarol.--An interesting observation on the melting point of toxicarol, a constituent of several types of derris, has been made by H. A. Jones and J. W. Wood. This compound can be obtained in two isomeric forms known as alpha and beta. The former is the higher melting form and the one usually isolated from derris. Values obtained by previous investigators for the melting point of alpha-toxicarol have shown considerable variance. Jones and Wood have now found that the type of glass from which the capillary melting-point tubes are made has a marked effect on the value obtained. In ordinary soft glass the melting point may be about 20° lower than in Pyrex and in one type of soft glass it was found to be over 30° lower than in Pyrex. The glasses causing a lowering of the melting point have been found to be more alkaline than Pyrex, that causing the graatest lowering being the most alkaline of the group tested. As alpha-toxicarol is changed by alkali to the beta form, it is undoubtedly this factor which causes the observed lowering. It is therefore essential to use Pyrex or similar glass of low alkalinity for determining melting points of this material. This discovery may have wide application in the determination of this important property as many other compounds may be expected to show similar differences.

BEE CULTURE

American foulbrood in larvae produced by small number of spores of Bacillus larvae White.--A. W. Woodrow, Laramie, Wyo., reports as follows concerning controlled inoculation of individual honeybee larvae resulting in American foulbrood infection: "Larvae of known age are obtained by confining the queen on a clean brood comb for about 1 day in a perforated zinc cage. After hatching, larvae of known age are inoculated by introducing spores of B. larvae in water suspension to the royal jelly on which the larvae are feeding by means of a hypodermic syringe, each larva receiving about 1/5,000 cc. of the spore suspension. The comb containing the inoculated larvae is then placed in the broodnest of a healthy colony for completion of the larval-feeding period. After the brood is sealed the comb is enclosed in a wire-cloth cage to prevent the bees from removing any brood that might become diseased. Just prior to the time of emergence the brood is examined to determine the infection produced by the inoculations. Based on dilutions of the original suspension, in which the spore content has been calculated to be approximately 500,000,000 per cc., larvae may be infected by an extremely small number of spores. In the brood of 14 combs inoculated with 1 dilution preparation, the average proportions of infected larvae produced by various calculated numbers of spores were: 1 spore, 17.8 percent; 2 spores, 23.4 percent; 5 spores, 51.1 percent; 10 spores, 68.6 percent; 25 spores, 81.1 percent; 50 spores, 84.1 percent. Improvements in technique have resulted in higher proportions of infected larvae for those given 50 spores than were obtained earlier with larger numbers of spores, even up to 100,000 per larva. Fifty spores, or more, have produced 100-percent infection in some experiments, but no suspension has produced this proportion in all experiments, probably because of difficulties in inoculation technique. Infection has been produced only in larvae inoculated within 2 days after hatching of the eggs. Inoculation of larvae less than 1 day old produces a much higher proportion of infection than inoculation of larvae 1 to 2 days old. Brood from 'resistant' colonies inoculated by this method becomes infected to about the same extent as that from 'susceptible' colonies."

Incense-cedar honeydew.--Geo. H. Vansell, Davis, Calif., reports: "A heavy population of the 1940 brood of *Xylococculus macrocarpae* Cole. is present at the 4,000-foot level in Eldorado County. These young individuals are now producing an increasing steady supply of honeydew. The exudate appears in small drops at the distal end of a waxy tube projecting from under the scales of tree bark. In spite of the apparent colorless nature of these drops, the honey in the combs has a distinct amber tinge. An occasional yield of white honey is reported but continued observations for a number of years have failed to reveal a colorless honey known to be from incense cedar."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Nevermann collection of Central American Coleoptera acquired.--The collection of Central American Coleoptera assembled by the late Ferdinand Nevermann, of San Jose, Costa Rica, has recently been obtained by the Bureau and is now available to the specialists on Coleoptera in this Division. It contains approximately 33,000 specimens, representing 2,800 named species, and in addition about 10,000 unidentified beetles. Types, cotypes, or paratypes of nearly 400 species are included. This collection will be of much assistance to the Division, because Central American species of Coleoptera have been poorly represented among the available reference material.

California record for an introduced ant.--Specimens of the introduced greenhouse ant *Pheidole anastasii* var. *cellarum* Forel were recently received from V. E. Williams, of Los Angeles County, Calif., with the statement that the ants were infesting a nursery in west Los Angeles. Although this ant is often encountered in greenhouses in the Eastern States, this is apparently the first time it has been noted in California.

Identification of a thrips on carnations from Europe.--Adults and nymphs of what appears to be *Haplothrips cottei* (Vuillet) were taken by the Division of Foreign Plant Quarantines at New York from flowers of carnations found in quarters of the S. S. *Exochordia* arriving from Europe on August 2. The exact point of origin could not be ascertained. This species of thrips is not known to occur in the United States and has not previously been intercepted by quarantine officers of the Bureau. It was described in 1913 from the vicinity of Marseille, France, as deforming the buds of carnations and was later recorded from Egypt as a pest of the same flower.

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FRUIT INSECT INVESTIGATIONS

Raisin moth and grape spoilage.--A survey of infestation and decay of grapes was made in July, August, and September by George H. Kaloostian, of the Fresno, Calif., laboratory. The total number of bunches examined was 4,974, of which 696 had been damaged. The injuries found were classified as follows: Rot alone, 20.3 percent; rot followed by secondary infestation by *Drosophila* and nitidulid beetles, 64.8 percent; rot and infestation by the raisin moth (*Ephestia figulilella* Greg.), 6.6 percent; rot and infestation by the grape leaf folder (*Desmia funeralis* (Hbn.)), 0.3 percent; infestation alone, by the raisin moth, 8.0 percent. The raisin moth occurred in 14.6 percent of the damaged clusters and in about 2 percent of the total number examined. As nearly as could be judged, the primary causes of spoilage were: Crushing and cracking of berries during growth, 86 percent; insects (practically all raisin moth), 12 percent; and birds, 2 percent.

Procedure for tests of Japanese beetle insecticides or repellents.--In order to develop a method for evaluating under field conditions materials that offer promise as Japanese beetle repellents, a new type of experimental set-up was tested in the summer of 1940 by W. E. Fleming, E. D. Burgess, and W. W. Maines, of the Moorestown, N. J., laboratory. Because of the localized nature of feeding by the Japanese beetle, and the fact that most materials that give protection act chiefly as repellents, field experimentation in established plantings does not always give dependable results. It is, however, essential to determine the performance under actual field conditions of materials that have shown initial toxicity or repellency under controlled laboratory conditions. An additional reason for field experimentation in certain cases is a recent decision of the United States Court of Customs and Patent Appeals, in Interference Case 71,407 (see Bureau News Letter v. VII, No. 8, August 1, 1940, p. 37). In the opinion of this court, an invention concerning the insecticidal use of any material is not reduced to practice until it has been tested under conditions in which the insect is naturally found. For use in these field experiments 25 tubs of smartweed were prepared, with 5 plants per tub. The plants had been fertilized with a nutrient solution and were vigorous and uniform in size. The plants in 5 of the tubs were unsprayed, those in 5 were sprayed with 6 pounds of lead arsenate (acid) and 1.5 pints of linseed oil per 100 gallons of water, and those in the remainder were sprayed with materials. A, B, or C. The tubs were arranged about 4 feet apart in the form of a Latin square on a farm near Holmdel, N. J., where the Japanese beetles were abundant. After 1 week the tubs were brought to the laboratory and for the plants in each tub the numbers of leaves completely consumed by the beetles were determined. The average number of leaves eaten by the beetles on the plants receiving different treatments, and the percentage reductions in feeding, as compared with that on unsprayed foliage, are given in the following table.

Treatment	Average leaves eaten	Reduction in feeding
	Number	Percent
Unsprayed plants----	133.8	----
Lead arsenate-------	6.0	95.5
Spray A-------------	70.6	47.2
Spray B-------------	73.4	45.1
Spray C-------------	100.6	24.8

It was apparent that the lead arsenate spray gave almost complete protection of the plants and that sprays A, B, and C were definitely inferior. A statistical analysis showed that in this case a difference of 28.1 in the average number of leaves eaten was needed for significant differences (5 percent odds). On this basis the differences between spray C and either spray A or spray B were not far from the borderline of significance. This procedure has the advantage that the sprayed plants can be taken to a locality where a heavy infestation is present; it is not dependent on chance, as was the case in the past, when experimental sprays were applied in orchards with no assurance that the infestation would be as severe as in the previous season.

Cage production of oriental fruit moth parasite.--The role of *Macrocentrus ancylivorus* Roh. in reducing oriental fruit moth infestation in peach is becoming more generally recognized, and the possibilities of large-scale production of this parasite are of increasing interest. The oriental fruit moth project at Moorestown, N. J., has been propagating this parasite in field cages over strawberry since 1937. The results reported by H. W. Allen, in charge of this work, are summarized in the following table.

Year	Size of caged area	Parasites obtained			Propagation rate			
		Females used in breeding	Total	Females	Total females obtained for each female used in breeding	Parasites obtained per acre	Parasites obtained per 1,000 infested leaves collected	Unusable insects per 1,000 emerging
	Sq.ft.	Number	Number	Number	Number	Thousands	Number	Number
1937--	300	45	1,079	548	12	157	261	619
1938--	1,200	506	17,453	6,125	10	634	747	229
1940--	4,158	2,052	45,008	18,909	9	470	555	405

The size of the caged area has been increased each year, from 300 square feet in 1937 to 4,158 square feet in 1940, and the results obtained from the larger size cages have been as a whole better than from the first cage tried. The number of Macrocentrus propagated has increased from 1,079 in 1937 to 45,008 in 1940. The propagation rates from field cages were higher than those from field-collected material. In 1940 the open strawberry fields about Moorestown averaged 25,000 Macrocentrus per acre, of which about 13,000 per acre could be reared. This is in marked contrast to the rate of 470,000 per acre obtained in the cages. From the field-collected material 248 Macrocentrus were reared from each thousand leaves collected, as compared to 555 from the cage material. This means that less than half the space was required to house the caged-reared material, and half the time required to collect it and care for it through the rearing period, for each unit of parasites obtained. From the field-collected material there were 724 unusable insects out of each thousand, as compared to 405 in the cage-bred material. Thus the field-collected material required nearly twice as much time to sort out and assemble each unit of parasites as did the cage-bred material.

MEXICAN FRUITFLY CONTROL

Conditions in the lower Rio Grande Valley.--The 1940-41 Texas citrus fruit crop made only nominal gains toward maturity during September. Maturity tests made by the Texas State maturity division indicated that very little fruit would be ready for harvesting when the season was officially opened early in October. It was reported that grapefruit particularly was short in juice content, but that some of the pink varieties would probably meet the requirements early in the month. Oranges have progressed more rapidly and it was expected that harvesting of this variety of fruit would exceed grapefruit harvesting when the season opened. Although traps were operated throughout the regulated area during September, only 11 specimens of the family Trypetidae were submitted for identification. Four of these were Anastrepha ludens Loew, 3 A. serpentina Wied., and 4 A. pallens Coq. In Matamoros, Mexico, 6 adult A. ludens were trapped on 5 properties and 316 Anastrepha larvae were collected from fruit on the markets. There continues to be a noticeable deficit in the rainfall for the lower Rio Grande Valley area. Only 1.58 inches were recorded at Brownsville in September. The normal is 5.52 inches, and the accumulated deficit from January 1 is 8.82 inches.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Insecticides for control of European corn borer in sweet corn.--D. D. Questel, Toledo, Ohio, reports the results of field-plot insecticide investigations for control of the European corn borer near Toledo, Ohio, during the 1940 season as follows: "Ground derris spray, as in previous years, provided high protection to early market sweet corn, with no resulting plant injury. The total borer reduction with ground derris root (4.7% rotenone), 4 pounds to 100 gallons of water, showed no advantage over 3 pounds to 100 gallons. Results of current season's investigations indicate that ground derris can be used satisfactorily at the 3-pound dilution, and that possibly a dilution of 2 pounds to 100 gallons would be satisfactory for commercial use. Two synthetic cryolite preparations, used at the rate of 1 pound to 100 gallons of water, gave high borer reductions but also caused stunting and reduction in yield. Attempts to find a buffer to prevent the burning action of cryolite on corn, in cooperation with the Insecticide Division, and prior to the regular spraying season, failed after 80 various combinations and preparations were given field tests. Ground derris, 90 percent, mixed with synthetic cryolite, 10 percent, and sprayed at the rate of 2 pounds to 100 gallons of water, gave high control but caused typical cryolite injury. Among the new materials tested in spray combinations, azobenzene gave the highest control, although accompanied by some bleaching and plant injury. Two of the new materials, phenazine and E-1538, caused very severe plant injury and reduced yields greatly; however, none of the new materials tested provided protection from the borer comparable to the derris preparations and, in conjunction with their injurious effects, are not considered of value for possible commercial use against the European corn borer. Ground derris dust containing 1 percent rotenone was applied at rates of 20, 30, and 40 pounds per acre. In addition, ground derris mixed with a dust carrier so as to contain 2.0, 1.0, and 0.5 percent rotenone, respectively, in the mixed dust was applied so as to provide the same rotenone dosage per treatment but in varying concentrations in the carrier. The resulting data indicate that derris-dust preparations applied either at 20 pounds per acre containing a 1-percent rotenone concentration, or 48 pounds per acre containing 0.5 percent rotenone, are as satisfactory for controlling the borer as preparations involving higher dosage or rotenone concentrations. However, as in previous years, the protection afforded by dust preparations was considerably lower than that provided by sprays and it appears that improvement in the performance of dust preparations is dependent on possible modifications of the application schedule to provide more complete coverage during the hatching period of the borer. Of the various combinations used in dust preparations, those containing 10 percent cryolite gave the most protection from the borer, although accompanied by some injury and possible yield reduction. The derris preparations provided the next highest protection with no accompanying plant injury. While dual fixed nicotine caused no plant injury, it afforded the least protection of any of the dust preparations used. Preparations of five dust carriers--walnut-shell flour, bentonite clay, wheat flour, pyrophyllite, and gypsum, mixed with 10 percent cryolite, gave control in the order named, with walnut-shell flour providing the greatest borer reduction. For dust preparations all five gave high control but all showed injury due to the cryolite and probably reduced yields. Preliminary tests were conducted with a boom sprayer (horse drawn), in cooperation with the Bureau of Agricultural Chemistry and Engineering. The results compared favorably with those obtained from hand applications and it is indicated that boom applications of spray materials can be developed for practical use in control of the European corn borer.

Stored corn insects and the "ever-normal granary."--In response to a demand resulting from the operation of the "ever-normal granary," the sum of $6,000 has been allotted to this Bureau by the Commodity Credit Corporation for stored-corn-insect investigations. This sum will be expended in the solution of problems arising from the storage of corn in farm- and government-owned bins, in cooperation with the several agencies concerned in the operation of the "ever-normal granary." Temple F. Winburn, of the Manhattan, Kans., staff, has been assigned to this work under the supervision of R. T. Cotton, with headquarters at Urbana, Ill. Mr. Winburn's mail address is P. O. Box 62.

Alfalfa weevil project terminated and Mormon cricket research expanded.--On June 30, 1940, the alfalfa weevil research project, with headquarters located at Room 483 Federal Building, Salt Lake City, Utah, was terminated. This project, which was begun in 1910, and therefore was conducted for a period of 30 years, resulted in a thorough knowledge of the bionomics of the insect and the origination of satisfactory and economical control methods. Coincident with the termination of this project the research work on the Mormon cricket has been expanded by the establishment of a new station at Winnemucca, Nev. J. C. Hamlin, formerly in charge of the alfalfa weevil project, was placed in charge. The street address is: Corner of West Fifth and Pavilion Streets, and the mailing address is P. O. Box 76, Winnemucca, Nev. H. H. Walkden, formerly located at Manhattan, Kans., has been designated as assistant at Winnemucca.

Corn borer infestation in growing wheat.--The following report of corn borer infestation in wheat was received on July 11 from C. A. Clark, Moorestown, N. J.: "This wheatfield was located at Vincentown, Burlington County, N. J. On July 13 an examination was made and extensive breakage was evident. An examination of the stems showed approximately 25 percent infestation. Some borers, which at this time were almost all mature larvae, could still be found but extensive migration had taken place from the dried-up and broken stems, and most of the stems showing evidence of infestation were empty at the time of the examination. This is the first case of a serious corn borer infestation in a field of farm-grown wheat to come to the attention of the writer."

Damage to popcorn by European corn borer.--Morris Schlosberg, Toledo, Ohio, reports that in a series of samples of popcorn plants differentially infested with European corn borer egg masses by hand in 1940, near Toledo, the surviving larval progenies averaged 4.3, 10.3, 16.7, and 19.7 larvae per plant. On the basis of 20 plants, as an average of 3 replicated tests in each instance, the resultant yields of ears, as harvested, were 4.95, 3.43, 1.93, and 0.97 pounds, respectively, for the levels of population given above. When plotted in a graph, the relation between yields and levels of larval populations was indicated to be linear. The potential yield in the absence of borers was calculated to be 6.067 pounds per 20 plants, the reduction in yield per additional borer per plant 0.254 pound, and the percentage reduction per additional borer per plant 4.19. In a similar series of tests conducted in 1939, involving a range of populations up to 6.52 larvae per plant and the same hybrid strain of popcorn, each additional larva per plant reduced the potential yield in the absence of borers by 6.36 percent. As in 1940, the relation between yields and levels of larval populations was found to be linear. Allowing for experimental variation, the difference between the values of percentage loss per additional larva per plant obtained in 1939 and 1940 is attributed to the relative stages of development of the plants when infestation occurred in the different seasons. In 1939 the plants were infested 27 days prior to silking of 50 percent of the plants, and in 1940 infestation occurred 14 days before silking of 50 percent of the plants. It has been shown that a greater per-borer loss is associated with infestation at earlier stages of plant development, owing to greater injury of the plants. The differences in development of the plants in the 2 seasons when infestation occurred were also reflected in the survival of larval progenies. For nearly similar infestations with numbers of eggs, the experiment averages in 1939 and 1940 were 4.2 and 12.8 larvae per plant, respectively. In part, the higher value obtained in 1940 may be attributed to the presence of the tassels on the plants in that season when infestation occurred, the mean date of tasseling and date of infestation being coincident, July 27. The presence of the tassels when infestation occurs has been found conducive to higher survival rates of larval progenies, independently of the influence of stage of development of the plants prior to the phenomenon of tassel appearance.

JAPANESE BEETLE CONTROL

New soil-treating equipment purchased.--Several new features are incorporated in six soil-treating sprayers recently purchased. The most important innovation consists of dual pumps, one for water and the other for lead arsenate solution. The tank is divided into two compartments, both of which are used for lead arsenate solution. By means of a 1½-inch hose, the unit is connected directly with a city water supply. The water pump merely acts as a booster for the city water. Although 40 gallons per minute can be obtained from the water supply, only 20 g.p.m. are needed in the water pump, therefore an equal quantity is available for alternately filling the lead arsenate tanks. In this way the application of lead arsenate and the subsequent washing in of the lead arsenate is a continuous, concurrent operation. Four lines of hose can be used, two each for the water and the insecticide. A special by-pass hook-up is used on the pumps. Instead of by-passing into the tanks, they are by-passed back into their respective intake lines, which permits the nozzleman to shut off any or all lines and the pump will still continue to operate without adjustment. It is anticipated that one of these units is capable of treating as much ground as two of the old type, single-pump sprayers. All foremen and truck drivers who have been previously assigned to soil-treating operations were called to Bloomfield the latter part of September and instructed in the operation of these new machines. An improved technique of application has been worked out, based on new nozzle designs and methods of checking the accuracy of lead arsenate application.

Floating oriental mats investigated.--Following up a report that appeared in the sports column of a Richmond, Va., newspaper, inspectors of this Division investigated the alleged finding of Japanese beetles in bunches of fresh leaves in the center of floating mats of bulrushes or reed and ricegrass which had been dumped into Chesapeake Bay by Japanese ships bringing cargoes to Norfolk and Baltimore. The story was to the effect that these mats are used in buttressing the cargoes to prevent shifting in rough weather, and that just before the ships dock the mats are thrown overboard. Individuals and Coast Guard officials near Cape Charles, Va., having knowledge of these mats were interviewed. One Coast Guardsman said that he had noticed these mats along the shoreline and beaches for the last 20 years. A Coast Guard truckdriver took the inspectors for a tour of approximately 30 miles along the shore line. Several of the mats were found and examined, but no living Japanese beetles were found in them. Flotations of Japanese beetles from the heavy infestations in both Delaware and Maryland have been numerous in recent years and what has apparently happened is that the straw mats thrown overboard have accumulated a lot of floating weeds and a quantity of Japanese beetles, some of which may have worked their way into the middle.

Outlook for fall nursery shipments.--The increase in nursery and landscaping business is attributed to the large number of new homes being built. Inspection work has already increased in the Eastern Shore area, owing to the finding of Japanese beetles on practically all nurseries in that area, thus requiring the actual inspection or chemical treatment of stock shipped from these establishments. A report from Philadelphia indicates that the wholesale cut-flower business there this summer was better than in 1939. Several Philadelphia nurserymen predicted a good fall business, with a substantial number of orders on hand. Considerable building being done in the Philadelphia area should increase the demand for landscaping.

Chemical treatments.--A nursery at Bridgeton, N. J., has constructed a large addition to their present packing shed for use primarily in treating azaleas with paradichlorobenzene. At one end of this addition a large fan is placed to remove gas from the building. A heating system is provided to keep the temperature up to the required point, regardless of outside conditions. In northern New Jersey 30,000 azalea plants were treated with paradichlorobenzene during the month. These treatments will continue into October. Azalea treatments with methyl bromide were started early this year, as compared with 1939, affording an opportunity to pick days on which temperatures were more satisfactory for this type of fumigation. During September, 136,166 plants were fumigated with methyl bromide, as compared with 125,327 fumigated with this product in August, and 89 carloads of potatoes were also fumigated with methyl bromide during the short period early in the month when this was required.

Precautions to prevent infestation of refrigerator cars by flying beetles lifted.--By September 9, flight of the Japanese beetle had subsided sufficiently in the heavily infested area so that requirements for the inspection or fumigation of refrigerator cars before they were loaded with certified fruits and vegetables, and the provisions for screening such cars, were discontinued on that date. Certification of fruits and vegetables moving from the heavily infested area via refrigerator car and motortruck was continued through September 18, after which the seasonal quarantine on farm products was discontinued for the year. As usual, the inspection and certification of cut flowers moving from the regulated area were continued until October 15, as beetles this year were present, but not in flight, later in the season than usual in many sections of the infested zone.

Control at isolated infestations.--Soil treating in Atlanta, Ga., which started on August 14, was completed on September 4, with a total of 14.8 acres treated, of which 1.2 acres was treated in September. In East Point, Ga., 9.6 acres of soil was treated August 26 to September 7, inclusive, with 4.8 acres treated late in August and 4.8 acres early in September. In Chicago, Ill., 46 acres of soil was treated in the period August 29 to September 30, of which 5.7 acres was treated in August, and 40.3 acres in September. In Fort Wayne, Ind., 13.7 acres of soil was treated on September 6 to 17, inclusive, and in Warsaw, Ind., 9.9 acres was treated on

September 23 to 30, inclusive, the last treatments continuing into October. In Detroit, Mich., 34.6 acres of soil was treated on September 9 to 30, with operations only partially complete.

Trapping completed.--During September, lifting of Japanese beetle traps was completed in 6 cities in Arizona; 1 city each in Minneosta, Nebraska, New Mexico, North Dakota, Utah, and Wyoming; 2 cities each in Colorado, Idaho, Indiana, Louisiana, Michigan, Mississippi, Tennessee, and Vermont; 3 in Illinois; 4 each in California, Missouri, Oregon, and Wisconsin; 5 in Washington; 8 in Pennsylvania; 14 in Maine; 19 in Texas; 20 in New York; and 42 in Maryland. The Maryland traps were operated by the State in connection with their retardation campaign. The only traps still in operation at the end of the month were a few in California and Vermont and in a number of small communities in other States which crews had not yet reached to dismantle.

New details of fumigation chamber construction.--Supplement No. 1 to the handbook previously distributed to inspectors, showing construction details for an approved methyl bromide fumigation chamber, was issued during the month. The supplement gives details for the construction of a chamber of approximately 200-cubic foot capacity. It includes a purchase list, and a material list, along with detailed drawings of the framing, doors, lining, and electrical wiring and connections.

Fish story.--Information was furnished to the district inspector in New York City by one of the port inspectors there to the effect that while fishing in the Rockaway River near Dover, N. J., on September 4, the inspector caught 3 brown trout. When these fish were cleaned, a total of 31 Japanese beetles were removed from their stomachs. One contained 5 beetles, another 6, and the third 20. Some of the beetles were still alive.

Airport inspection.--The inspector stationed at the Philadelphia Airport from July 14 to August 31, found 79 beetles, 2 dead and 77 alive, in and on departing planes. Nine were in the planes, 12 on baggage, 31 on passengers, 9 on members of the crews, 16 on mail pouches, and 2 on mechanics. Beetles along the Philadelphia water front, except in the extreme southern part of the city, were scarce.

Dutch elm disease scouting results.--Suspect scouting within the known infected area, which was rather largely and intensively scouted by the foot-scouting method last year, was this year handled largely by auto and auto-foot types of scouting. There were, however, 65 areas selected on the basis of last year's infestation and widely scattered throughout Connecticut, New York, New Jersey, and Pennsylvania, which were intensively scouted this year. There was a 60-percent reduction in disease this year over last year in these intensively scouted areas, as compared with a 65-percent reduction over the entire infected area of the State. No scout schools were conducted this year and hence the full time of the scouts was used in actual scouting work. This could be done because there were available 850 W. P. A. scouts who were trained last year, and 450 of the highest ranking per diem scouts of last year and other trained scouts that could be employed on regular funds this year for work in the major area.

First-record Dutch elm disease infections.--In New Haven County, Conn., first-record infections were reported from the towns of Middlebury, Naugatuck, New Haven, Orange, and Woodbridge. New York townships in which confirmed trees were found for the first time were Bainbridge, in Chenango County, and Claverack and Taghkanic, in Columbia County. Also, first-record infections were reported from the city of Kingston, in Luzerne County, and from the townships of Jackson and Lanesboro, in Susquehanna County, Pa. Three diseased trees were discovered by scouts working outside of the main infected area during the month. Two of these were found in Washington Township and the other in Pike Township, both in Marion County, Ind.

Ice damage handicaps work.--In Connecticut apparent major symptoms that warranted climbing for the purpose of obtaining samples, and in most cases on the larger shade trees, proved to be the result of the ice-storm damage of last March. No actual breakage was visible and in most instances it was not until the cuttings were dropped to the ground that these limbs, about 1 inch in diameter, were found to be twisted rather than broken off. The tree had attempted to heal on the twisted part, and it is evident that perfect recovery cannot occur.

Drop in New Jersey confirmations.--The week ended September 7 was the first time since 1935 that the number of trees confirmed in New Jersey during the scouting season was less than the number confirmed in either Connecticut or New York, 51 having been confirmed in New Jersey, 73 in Connecticut, and 95 in New York.

Elm scouting discontinued.--Suspect scouting was discontinued in the entire work area on September 28. During the summer scouting season a total of 15,746 square miles was scouted on the first suspect survey, and 13,230 square miles on the second suspect survey.

Decreased W. P. A. personnel.--The W. P. A. personnel in Connecticut and New York has shown a gradual decrease in numbers, owing to the assignment of project employees to job training under the supervision of the National Defense Commission.

New England inspection activities.--Last summer weather conditions in New England were very favorable for Japanese beetle scouting, there being few rainy days throughout the season. Scouting was discontinued on September 7. Infestations were found as follows: Connecticut, 21 units in 9 nurseries; Massachusetts, 3 nurseries and 2 greenhouses; New Hampshire, 1 perennial garden; Rhode Island, 2 nurseries and 1 private estate. Beetles were observed feeding at Bellows Falls, Vt., on September 23 and in New London, Conn., on the 27th. Eight temporary gypsy moth inspectors were employed during the month--3 in Maine, New Hampshire, and Vermont for the carlot inspection of lumber, and 5 in western Maine, western Massachusetts, Rhode Island, and Connecticut for the inspection of nursery stock. Connecticut State gypsy moth scouting crews reported the finding of several gypsy moth infestations within a radius of 1 mile from 3 large nurseries in the Manchester, Conn., area. During the month 401 egg masses were removed from forest, quarry, and nursery products submitted for inspection.

At Danvers, Mass., 133 egg clusters were removed from 10½ cords of birchwood inspected prior to its manufacture into novelties. At Winchendon, Mass., 3 egg masses were removed from 2 bales of birch bark also intended for novelty manufacture. At Westfield, Mass., a female gypsy moth was observed depositing eggs on September 9, an unusually late date for oviposition.

Hurricane lumber sold.--Orderly marketing over a period of 4¼ years is provided for in the sales' terms of a contract by which 425,000,000 board feet of the softwood lumber salvaged in the New England States by the Government was sold recently to a corporation. Gradual distribution of this lumber will facilitate its inspection under the gypsy moth quarantine regulations.

FOREST INSECT INVESTIGATIONS

Ambrosia beetle attacks elm trees.--In studying the habits of an introduced ambrosia beetle, Xylosandrus germanus (Bldfd.), W. D. Buchanan, of the Morristown, N. J., laboratory, has found that the adults will attack areas on living trees from which the bark has been entirely or partially removed. The bark was shaved from parts of the trunks of several woodland elms so as to leave only a thin layer of the inner bark. Muslin sleeves were attached to the trunks so as to enclose the shaved portions and the surrounding uninjured bark. Beetles that were introduced into the sleeves bored into only the shaved areas. On other trees areas were similarly shaved or the bark removed entirely. No sleeves were attached to these trees. Again the beetles attacked only the injured areas. This indicates that X. germanus adults rarely if ever bore through the unbroken bark of living trees but will attack surfaces from which the bark had been partly or entirely removed.

Dutch elm disease spreads where Scolytus multistriatus does not occur.--In 1939 and 1940, R. T. Webber, Morristown, made observations on elms in Broome and Chenango Counties, N. Y. Trees affected by the Dutch elm disease were first found in this area in 1939 by the Bureau's Dutch elm disease eradication unit. Findings in 1940 have not only increased the total number of diseased trees but extended the limits of the area into neighboring parts of New York and Pennsylvania. This area is particularly interesting from an insect standpoint because no S. multistriatus (Marsh.), which is considered the most important insect vector of the Dutch elm disease fungus in the United States, has been found there. Mr. Webber states that the elms in the area are generally in poor condition, with considerable dead wood in them, and they have suckered freely. The disease has apparently been present for several years. Ideal conditions exist for a build-up of certain insects such as Hylurgopinus rufipes (Eich.), Saperda tridentata Oliv., and Magdalis spp. H. rufipes is and has been very abundant, and it has been found that the adults have commonly penetrated the bark of diseased trees and contacted the xylem. Larval galleries of H. rufipes and S. tridentata, extending from dead to living parts of the bark and wood, were also found. These observations, with others, indicate that H. rufipes and possibly other species, are responsible for the disease persisting and spreading in the area.

Hemlock looper less abundant in Wisconsin this year.--H. C. Secrest, Milwaukee, Wis., reports that the looper population in 1940 in hemlock stands on the Menominee Indian Reservation decreased from that of 1939, when larvae were somewhat common. This decrease probably was caused by the cold, cloudy, and very wet weather in June when the young larvae were crawling to the foliage.

Hemlock borer attack decreases in Wisconsin.--Mr. Secrest reports a very noticeable reduction in the beetle population for the first time since the hemlock borer project was initiated in 1937. Salvage of practically all the remaining dead and dying trees during the winter and their utilization before the beetles could mature and emerge reduced the population in a marked degree. The favorable growing seasons since 1938 made the living trees more vigorous and less suitable for successful attacks. Parasites were numerous again this year, approximately 50 percent of the larvae in many of the trees having been parasitized. It is expected that the borer population will be even further reduced in 1941 because of these factors.

Bronzed birch borer active in yellow birch in Wisconsin.--H. J. MacAloney, Milwaukee, reports that limited examinations in August of stagheaded decadent yellow birch in the cutover stands at the Menominee Indian Reservation showed that these trees were being attacked by the bronzed birch borer. These stands have been opened up during the course of salvage operations to remove dead, dying, and uprooted hemlock, to an extent which weakened the brich trees and allowed successful attack by the birch borer. The secondary nature of the attack was indicated by the fact that the bole and lower branches were attacked at the same time as the upper branches, and in some cases larvae were numerous in the lower part of the tree. The shoestring fungus was found at the bases of these decadent trees.

Decrease in budworm abundance in Minnesota.--Mr. MacAloney reports very light defoliation of jack pine on the Chippewa National Forest this year by the spruce budworm. Caterpillars were numerous in stands on the Cass Lake Ranger District in June, but very few completed development. This reduction is attributed to the cold, driving rains at the time the caterpillars were leaving the staminate flowers to feed on the foliage. Elsewhere on this forest caterpillars were scarce and defoliation was not noticeable. Examinations of buds of orchard-type jack pine trees in September indicate that staminate flowers in stands on the Cass Lake Ranger District will be abundant and, because of this, budworm abundance may increase in 1941. In other parts of the forest, however, there will be a scarcity of flowers and a still further reduction in caterpillar abundance may be expected.

Forest tent caterpillar apparently absent from national forest stands in Minnesota.--Mr. MacAloney also reports that for the second year no egg bands were found in the plots established in aspen stands on the Chippewa National Forest for the purpose of getting annual counts of the number of egg bands per tree. No larvae were found during the feeding season.

A root crown girdler of pine.--J. V. Schaffner, Jr., New Haven, Conn., reports that, in cooperation with the New York Conservation Department, examinations were made in September of Scotch pine plantations in the townships of Malta, Milton, and Moreau, in Saratoga County, N. Y., where *Hylobius radicis* Buch. caused considerable mortality about 1933 and shortly thereafter. Infestations of this root crown girdler are now generally light in these areas. Nearly every tree examined showed evidence of past infestation but apparently not all trees are infested at present. Although an occasional tree has died recently it is evident that no heavy mortality of trees has occurred during the last 5 to 7 years. Many trees which have survived heavy infestations are badly stunted and have exceedingly large butts in comparison to their height. However, although badly scarred at the root crowns, recent growth of the trees in these plantations is evidence of a general improvement. The plantations of Scotch pine which have been heavily infested are growing on very light sandy soil. The infestation still persists in a plantation of Corsican and Scotch pine in Weston, Mass., where observations have been made in the last two seasons and where the most severely infested trees were broken over in the hurricane of September 1938. Studies of the biology of this insect show a very complicated life cycle. Hibernation takes place both in the larval and adult stages, and all stages of the insect can be found during July and August. Laboratory experiments indicate that some of the adults may live over a period of at least 2 years. Adults which developed in the summer of 1939 mated and deposited eggs in June, July, and August 1940 and are still active and feeding considerably on the bark of pine twigs.

Exenterus marginatorius as a parasite of pine sawflies.--W. F. Sellers, New Haven, Conn., reports that E. marginatorius (F.) is ordinarily a common larval parasite of the European pine sawfly (Neodiprion sertifer (Geoff.)). This parasite was introduced into Canada by the Canadian entomologists and it has become established and is being recovered in considerable numbers as a parasite of the European spruce sawfly. As far as known, this parasite is of no importance in Europe as a parasite of the European spruce sawfly. Under laboratory conditions E. marginatorius oviposits as readily on Le Conte's pine sawfly and the introduced European pine sawfly Gilpinia frutetorum F. as it does on the European spruce sawfly. This parasite has been successfully reared through one generation on Le Conte's pine sawfly. Le Conte's sawfly is native to this country, and at present it is being reported from widely scattered areas in epidemic proportions in our pine plantations.

Multiple superparasitization by dipterous parasites helps to control satin moth.--Mr. Sellers states that early this summer a collection of 7 larvae and 3 pupae of the satin moth was made with a great deal of difficulty by J. E. R. Holbrook, of the New Haven laboratory, at Waterbury, Conn. This collection produced 1 male and 1 female satin moth, 5 Compsilura concinnata Meig. tachinid parasites, and 14 Exorista mella Walker tachinid parasites. In 1 specific instance at least 1 Compsilura and 1 Exorista puparium were recovered from the same host pupa. It was apparent from the large numbers of E. mella and C. concinnata obtained that some cases of multiple superparasitization, which means survival of 2 or more species of parasites, occurred. Superparasitization means survival of more than 1 individual of same species. Mr. Sellers observed in other cases that under equal conditions of competition and host selection, a species of Tachinidae capable of superparasitization can coinhabit the same host specimen along with another species which is also capable of superparasitization; whereas when a species capable only of solitary parasitization (survival of 1 specimen) enters into competition to coinhabit the same host specimen with another species capable of either solitary or superparasitization, only 1 species will survive.

Large proportion of white pine trees still alive in certain hurricane-affected stands.--H. A. Bess, New Haven, reports that a few of the unsalvaged hurricane-felled white pine stands in Winchendon, Mass., and vicinity were examined from time to time throughout this season for insect damage and salvageability. In the spring as high as 70 percent of the trees present were living and undamaged by insects. The conclusions drawn from these studies are that there was practically no further mortality of the trees this season and none of the living trees were injured by insects. Probably the relatively cool wet season prolonged the survival of these trees.

Heavy spruce bark beetle infestation in section of White Mountain National Forest.--T. J. Parr, New Haven, after a survey of spruce areas on the White Mountain National Forest of New Hampshire and the Green Mountain National Forest of Vermont during the latter half of August, reports as follows on Dendroctonus piceaperda Hopk. conditions: "In New Hampshire, areas where the spruce bark beetle was present previous to the hurricane show no increase in infestation, either in standing or wind-thrown timber, except in the Crawford Notch section. In fact, infestations have materially decreased or entirely disappeared in such areas as "The Bowl" at Wonalancet, Nancy Brook near Bartlett, and Mt. Osceola in Waterville Valley. In the Beecher Brook drainage in Crawford Notch, where wind-thrown timber is now being logged, a small stand of approximately 10 acres of old, standing spruce, located above the present timber sale, was found infested. It was estimated that nearly 50 percent of the trees on that plot were attacked. On the opposite side of Crawford Notch a much larger area of mature spruce is heavily infested. On one survey strip in that area 10 chains long and 1 chain wide, 10 heavily attacked trees were found, or 10 trees per acre. Attacks were characterized by the absence of pitch tubes on the tree trunks. The insects were in all stages from eggs to adults. A 100-percent survey of this area, to determine the extent of the infestation and to mark attacked trees for subsequent removal,was recommended. In Vermont some increase in the number of infested trees was noted on the permanent 54-acre sample strip on Monastery Mountain, where 11 infested trees were found this year, as compared with 2 in 1939 and 8 in 1938. There was a proportionate increase in attacked trees along the Long Trail from the junction of the Trail with the sample strip to Lake Pleiad. Only 2 attacked trees were found there in 1939, while 8 infested trees were spotted this year."

Forest-insect surveys.--The program of forest-insect surveys conducted from the forest-insect laboratory at Coeur d'Alene, Idaho, includes the white pine stands of the Coeur d'Alene, Clearwater, Kaniksu, Kootenai, and St. Joe National Forests, the lodgepole pine stands of the Minidoka National Forest and Yellowstone National Park, and some areas of ponderosa pine on the Salmon National Forest, as well as a small area of Douglas fir on the Sawtooth National Forest. Approximately 900,000 acres of merchantable timber will be covered by these surveys. They will show the present status of infestations of the mountain pine beetle in white pine and lodgepole pine, the western pine beetle in ponderosa pine, and the Douglas fir beetle in Douglas fir. This project will be completed during the latter part of October and reports of each area will be submitted promptly. As yet no serious infestations have been encountered, although there are small areas on the Coeur d'Alene and Clearwater National Forests where the infestation is sufficiently severe to warrant the institution of control, which has been recommended.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Gypsy moth larvae and pupae unusually late.--The development of gypsy moth larvae in the barrier zone and in Pennsvylania was decidedly uneven during the summer of 1940. Cool weather persisted well toward the end of June, and there was a heavy frost in some localities on June 23. The weather was cool again during the latter part of the summer, with a heavy frost in some sections, particularly in western Massachusetts, on August 23. This cool weather apparently slowed up the development of some of the larvae, so that they were present in the field much later than usual. As a rule, the moths complete emergence by the end of August or the beginning of September, although occasionally a few straggling moths can be found early in September. This year a considerable number of live pupae and moths have been located unusually late, not only in the Pennsylvania infested area but also in a good many towns within the barrier zone. The discovery of so many live pupae and adults has interfered to some extent with the scouting program. It is usually safe to start scouting immediately after the first of September, as all of the egg clusters will have been deposited by that time, but this scouting had to be discontinued until later at some localities because of the finding of live pupae. These are much more difficult to locate than egg clusters, and it is not advisable to scout in woodland until after the egg clusters are deposited. Records show the finding of live pupae, both male and female, of female moths just emerging from the pupal cases, and female moths laying, throughout the month of September and even into early October. Live gypsy moth larvae were found under burlap bands at one town in Connecticut on September 16.

Forest growth retains foliage because of no killing frosts.--Climatic conditions were generally favorable for gypsy moth work during September. The temperatures remained unusually low during the first part of the month, although no severe frosts or freezing temperatures have occurred since August 23; however, abundant evidence of the damage suffered on that date is present throughout New England. Foliage of vines and shrubs, such as poison ivy and sumac, have assumed the brilliant colors typical of fall conditions. Lack of rain for several weeks enhanced the forest fire hazard, and regulations prohibiting smoking or building fires by gypsy moth workers were rigidly enforced. The burning of brush accumulated as a result of thinning operations was also temporarily discontinued. Heavy dews and early morning fogs toward the middle of September left the forest growth dripping wet and caused some discomfort to the workers during the early hours of the day. A definite thinning of the foliage was discernible in the northern Vermont section of the barrier zone shortly after the middle of the month, as some varieties of trees and shrubs began to shed their leaves. No appreciable change in foliage density was apparent elsewhere in the barrier zone, although traces of fall coloring were occasionally noticeable on high slopes.

Work areas carefully selected in Vermont.--Because of the small force of workers which, apparently, will be available for gypsy moth work in Vermont during the coming winter, considerable time has been spent by the supervisory personnel in that State in examining the vicinity of infestations found during the past fiscal year in Addison and Rutland Counties, in order to determine where the work in the Vermont barrier zone area can be done most effectively with the prospective maximum of only 10 crews. Although satisfactory results were obtained from the treatment of the infestations found last year, a large area of heavily timbered mountainous country that should be carefully scouted before the advent of winter conditions still remains.

Several gypsy moth infestations found in Addison County, Vt.--A small force of supervisory employees detailed to scout around several gypsy moth infestations found in Ripton, Addison County, during 1939 discovered no indications of reinfestation at these previously infested locations. However, they found and creosoted several egg clusters deposited on fruit trees and on the under side of garden furniture at another previously infested site, and two moths were seen depositing eggs at this infestation during the first week in September. W. P. A. scouting crews working in Bristol, Middlebury, and Salisbury Townships, also in Addison County, discovered several reinfested spots at sites that had been banded with burlap but which had not been sprayed. Many of the egg clusters were found on deadwood and windfalls, which littered the ground.

Two new infestations located in Rutland County, Vt.--A newly laid gypsy moth egg cluster was found in Hubbardston Township, Rutland County, about the middle of September. Although this is the first infestation to be located in Hubbardston, the infestation of the town was not entirely unexpected in view of its close proximity to territory just east of the barrier zone, where numerous small infestations have persisted for several years and which are so located that new infestations might originate from the wind spread of small caterpillars. A small gypsy moth colony was also located in the adjoining town of Castleton, the first to be discovered there since 1924, when a gypsy moth colony covering several acres of rocky brush-covered pastureland was completely eradicated by intensive treatment work. Similar work will be done at the two new colonies.

Gypsy moth colony found on mountain slope in Vermont.--A W. P. A. crew scouting in Lowell Township, Orleans County, located a gypsy moth egg cluster on the north slope of Hadley Mountain, which is situated in the south-central section of the township. This egg cluster was found about ½ mile from the wood edge in an extensive tract of timberland consisting chiefly of rock maple, beech, and white, yellow, and black birches, with some spruce and fir balsam on the upper slopes. Intensive scouting in the vicinity of this infestation will be postponed until after the foliage has fallen.

Gypsy moth work in Connecticut.--Gypsy moth work in Connecticut has not progressed as rapidly as was expected, owing to the difficulty in obtaining and maintaining a full quota of workers. Several small infestations were found in Cornwall, Salisbury, and Litchfield Townships, in Litchfield County, and two small colonies were found in the Southbury, New Haven County, area that was infested last year. The disposal of brush accumulated as a result of thinning work conducted at West Hartford prior to July 1, 1940, was completed during the first week in September. The power-operated brush-disposal machine used at this infestation reduced more than 500 piles of brush to coarse sawdust and chips within 10 days, during a period when the dryness of the forests made burning impractical. Several crews engaged in removing burlap bands from infested sites in the Connecticut barrier zone area reported observing moths depositing egg clusters on or near the bands up to the middle of September. These egg clusters were creosoted, and the burlap bands containing egg clusters were carefully assembled for burning. At the end of the band-removal work it was found that approximately one-half of the bands were infested and would have to be burned, while the other half were suitable for salvage and future use in kindling brush fires.

Scouting of Lackawanna and Susquehanna River banks completed.--Despite the delays encountered in getting the gypsy moth project operating in Pennsylvania, 30 crews were working in that State by the first of September. A large percentage of the force was engaged at first in removing burlap bands from trees at infested sites. Later, several of the crews were detailed to the examination of driftwood and debris along the banks of the Lackawanna and Susquehanna Rivers. Whenever these rivers overflow large quantities of driftwood and debris are strewn along the river courses, lodging in the clumps of trees and brush that cover the islands and frequently extend in belts 100 feet or more in width along the banks. This rubbish must be disentangled and carefully examined. Fortunately, conditions were ideal for this type of work, as the rivers were low and many of the brush-covered islands could be reached over a dry river bed or by wading through shallow water. This work was completed during the week ended September 21 and resulted in the discovery of only 1 egg cluster, which was deposited on a small elm. The systematic scouting of the river banks within the quarantined area has been done every year since the gypsy moth was first discovered in Pennsylvania, in order to destroy infestations on river debris that might be carried downstream during periods of high water.

Types of C. C. C. gypsy moth work performed during September.--The number of 6-hour man-days used by the C. C. C. on gypsy moth work during September ranged from a weekly low of 1,378 to a weekly high of 1,742, totaling 6,435 man-days for the month. The time was spent in selective-thinning work, removing sprout growth at previously thinned areas, scouting, and creosoting egg clusters at infestations. Several large single white oak trees were also removed from locations that were especially susceptible to wind spread. Emphasis was placed on the removal of sprouts of plants favored as food by the gypsy moth and leaving sprouts of unfavorable growth, and a good growth of ash, maple, and pine is developing in several areas where this type of work has been done. In some places brush and debris accumulated from the thinning was burned but in other instances it was scattered, as is done with sprouts when they are cut. Such material will decompose before these areas will be reexamined. This reduces considerably the cost of operation and is in accordance with good forestry practices. The silvicultural treatment of different forest growths is stressed continually in C. C. C. gypsy moth work, and meetings are held from time to time with State forestry officials in order to coordinate and improve the methods of treatment. It is possible that C. C. C. gypsy moth work may be reduced in some of the States because of the prospective transfer of some of the camps or enrollees from their present work assignments to aid in the National Preparedness Program.

Report of C. C. C. burlapping work.--Most of the work of banding trees with burlap to trap gypsy moth caterpillars was delayed until the end of

June or the first part of July, as most of the men available were used on spraying work earlier in June, and the banding work was concluded at the beginning of September. As the season was late this year, owing to cold and rainy weather, the banding work showed good results despite the late start. One camp in Vermont burlapped trees on 201 acres, destroying 152,077 gypsy moth caterpillars and pupae. Three camps in Massachusetts burlapped trees on 603 acres and destroyed 91,502 caterpillars and pupae, and 3 camps in Connecticut burlapped trees on 244 acres and destroyed 50,856 caterpillars and pupae. In some cases the bands were removed from the trees early in September, but in others, where it was anticipated they could be patrolled to good advantage next year, the bands are left on the trees, a practice which has heretofore proved satisfactory and which greatly reduced the cost of operation by saving labor, besides getting 2 seasons' use of the burlap.

Areas selectively thinned last year show marked improvement.--Although C, C, C, gypsy moth work so far this year has consisted principally of silvicultural work, a small amount of scouting was done. The scouts have discovered no heavy infestations in Massachusetts or Connecticut, but the infestation is much denser in eastern Vermont. Marked improvement was noted at several locations in the last-named State, where thinning work was done at heavy infestations last year.

PLANT DISEASE CONTROL

Matheny called to defense duty.--G. E. Matheny, State leader of barberry eradication in Virginia and a reserve officer in the Marine Corps, has been called to active duty for a period of 1 year. Captain Matheny reported for duty at Marine Barracks, Navy Yard, Washington, D. C., on October 15.

Preliminary results of 1940 rust survey.--R. U. Cotter, acting in charge of the Federal rust laboratory, St. Paul, Minn., reports that rust collections identified prior to September 1 indicate that races 56 and 17 were the most common in the central part of the United States this year. It will be recalled that race 56 increased rapidly in the Middle West from about 1930 to 1935, when it caused extensive damage to Marquis and Ceres wheats. Race 17 has been comparatively rare in recent years and its potentialities are not fully known. It is one of the few races which has, under certain conditions, caused some infection on Thatcher wheat. Of the 13 races of wheat stem rust so far identified this year, race 56 represents 36 percent and race 17 represents 13 percent of the isolates. Other races identified include 11, 15, 19, 21, 34, 36, 38, 49, 59, 69, and 147. The different varieties of stem rust present in 185 aecial collections of the fungus identified by the Federal rust laboratory this year were as follows:

Puccinia graminis tritici	145 isolates
P. graminis secalis	37 "
P. graminis avenae	16 "
P. graminis agrostidis	1 "

A single collection from Meeker County, Minn., contained all 4 of these varieties. However, most of the *secalis* isolates came from Minnesota, Wisconsin, and Iowa, where ryegrass and quackgrass are susceptible and widely distributed hosts. More than half of the avenae isolates came from Pennsylvania where stem rust has caused considerable damage to oats in areas where barberry bushes are numerous.

Crawford County, Iowa, co-sponsors barberry eradication project.--According to D. R. Shepherd, State leader in charge of barberry eradication in Iowa, plans for undertaking barberry-eradication work in Crawford and Clayton Counties under a State W. P. A. program have been approved by W. P. A. and field work authorized. County boards of supervisors in these counties have agreed to sponsor the project, along with the Bureau, and to allot sufficient funds to pay all nonlabor costs. The County boards of supervisors in these counties will furnish ½-ton or 1½-ton trucks, with all expenses for upkeep and operation, and will pay operating costs on any government-owned equipment that may be used. The Crawford County board has agreed further to purchase ½ ton of salt per month for eradication purposes.

More than 7,000 barberry bushes destroyed in Ohio since January 1.--Since the first of January, according to a report furnished by Harry Atwood, State leader in charge of barberry eradication in Ohio, an intensive survey of approximately 2,050 square miles in 7 counties has resulted in the eradication of more than 7,000 barberry bushes on 67 different properties. In this area 1,067 previously reported properties were checked and 89 were found to have 1,122 bushes, of which only 52 were fruiting. This indicates that only about 8 percent of the old properties in these counties will require further attention.

Nebraska farmers aid in rust survey.--For several years Nebraska grain growers have supplied data relative to the extent to which their crops were damaged by stem rust. During the last month questionnaire cards were mailed to 1,492 grain growers throughout the State, according to M. E. Yount, who conducted this survey. The postal service returned only 11 cards because of incorrect address. Of a possible 1,481 growers who received the questionnaire, 1,248, or 84.26 percent, gave the desired information. The list of cooperating farmers has been compiled gradually and includes 1 farmer in each township. Most of the names were obtained from county agents.

White pines and Ribes of craters of the Moon National Monument.--Craters of the Moon National Monument, in central Idaho, is a 50,000-acre area of recent volcanic activity evidenced in the nature of craters, cinder cones, and lava flows. Reported for this area were 5,600 acres supporting white pine, which prompted a recent inspection to determine the urgency of blister rust control work. This revealed a total of approximately 20,000 acres supporting patchy Pinus flexilis at the rate of 1 to 200 trees per acre, growing on the older lava flows and at the bases of cinder cones and craters on wind-deposited soil. Peculiarly, this is the only conifer in prominence, although Juniperus scopulorum, Psaudotsuga taxifolia, and Pinus ponderosa are found occasionally. Associated with the limber pine is only 1 species of Ribes, R. cereum. Like the pines, these grow in patches and range from very few to about 250 per acre. Because of this species' low susceptibility to blister rust and the semiarid conditions of the Monument and adjacent country, no urgent control problem is indicated.

Northwestern region field conference.--During the 4-day period from October 2 to 5, blister rust control and timber management leaders of the Bureau and the Forest Service met for a conference on control problems and their relation to white pine management. This meeting, which is the second in a series of annual field gatherings to discuss technical problems, was held on the Deception Creek Experimental Forest, within the Coeur d'Alene National Forest. Chairman of the meeting was Neal D. Nelson, supervisor of control work on this forest. Discussion leaders were V. D. Moss, who is in charge of the Bureau's ecological investigations, and Charles Wellner, silviculturist for the Northern Rocky Mountain forest and range experiment station. Field trips were taken to inspect and study areas treated to various silvicultural practices, and these practices and their significance were the subject of group discussions.

Demonstration of blister rust damage in Maine.--An unprotected pine stand adjacent to a State highway near Belfast, Maine, is being utilized effectively to demonstrate damage caused by blister rust to merchantable-sized trees. All pines with stem cankers have been banded with yellow paint about 4½ feet above the ground. As 95 percent of the trees are infected with blister rust, the paint markings show up in a striking manner. Dead and dying trees are conspicuous throughout the 3-acre tract. The infection in this area was caused by wild gooseberries. Conspicuous near the entrance is a large sign indicating "Demonstration of Blister Rust Damage--Cooperation Maine Forest Service and the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture." Another sign, somewhat back in the woods, shows the amount of infection and designates the meaning of the painted bands. Hundreds of people visit the demonstration, and many give their names and addresses on cards and place them in a box provided especially for this purpose. Many persons request that their properties be inspected. Several favorable comments have also been made regarding the demonstration itself.

Scouting for blister rust in Yellowstone National Park.--The discovery in 1937 of Ribes infection in southwestern Montana, from the Bitterroot Valley to within 19 miles of Yellowstone Park, pointed toward the possible establishment of scattered pine infection centers in this general region. Scouting in September 1940 by sampling in drainages throughout the northern half of the park and adjacent areas failed to reveal evidence of such centers. Since only a relatively small part of the vast reserve was covered, it is still possible that small centers exist, possibly centers of few fruiting cankers or even those of cankers that did not fully mature in 3 years. One of the particularly interesting locations scouted was the place near the park where infected Ribes petiolare was found in 1937. Although two Pinus flexilis trees grow within 20 feet and many more in the near vicinity of this spot, no tree infection could be located.

Blister rust found on Ribes fasciculatum in Wisconsin.--Blister rust on Ribes fasciculatum Sieb. and Zucc. was found during the inspection of Ribes bushes on the University Farm at Madison, Wis. These plants were lightly infected with uredinia. No telial columns could be found even under a microscope. Unlike infection on most Ribes leaves, a distinct brick-red color on both sides of the leaf disclosed the infected portion of each leaf. These R. fasciculatum plants grew within 50 feet of R. nigrum plants heavily infected with telia. It is highly probable that no telia appeared on the R. fasciculatum because many of the uredinia were just beginning to break through the epidermis, that is, because the infection was too young.

COTTON INSECT INVESTIGATIONS

Orius insidiosus Say and other predators of cotton bollworm eggs.--Edward E. Ivy, at the Waco, Tex., laboratory, makes the following observations: "During the course of bollworm toxicity studies a number of bollworm moths were collected and placed in a large screen-wire cage set over 4 cotton plants. On September 1, it was noted that a large number of eggs had been deposited on the plants in this cage. Although no accurate count was made, 100 eggs were collected from the leaves, buds, and squares in about an hour; and since there were eggs on practically every leaf, and on the stems, as well as on the cage itself, it seems reasonable to estimate that there were at least 500 eggs in this cage. On September 5 a thorough search disclosed no viable eggs and only 3 worms. A large number of predaceous insects were present and many of the eggshells left adhering to the stems were collapsed as though sucked by predators. Orius insidiosus was most common, but there were large numbers of chrysopid larvae, coccinellid larvae and adults, and syrphid larvae. It is known that the eggs were fertile, as 81 percent of the eggs collected on September 1 hatched when placed in pill boxes and, of those which failed to hatch, fully half were found to contain a nymph of O. insidiosus which had accidentally been enclosed with the leaf and egg when placed in the box. It should be noted that these plants supported a large aphid population which, however, was being rapidly depleted by a fungus disease. On September 9 when the cage was again examined it was found that almost all the aphids had been killed by this disease. Consideration of all the known factors led to the conclusion that the eggs and young larvae of the bollworm had been destroyed by insects which, until the introduction of the bollworm eggs, were predaceous on aphids. It is thought that perhaps the decimation of the aphid population by the fungus had caused these predators to direct their attention to other food sources, resulting in almost complete elimination of a high potential bollworm infestation. The phenomenon of almost overnight disappearance of large numbers of bollworm eggs has been observed many times in the field. For instance, at the Waco laboratory in August 1939 an infestation of 72.3 eggs per 100 cotton tips declined in less than 48 hours to less than 12 eggs per 100 tips and no young worms could be found at the second examination. An experimental field at Waco in 1940 showed an average of 33.4 eggs per 100 tips on July 19. An inspection 6 days later showed only 4.5 eggs per 100 tips and practically no young worms. O. insidiosus nymphs and adults were confined in cages and glass jars with bollworm eggs with and without aphids. In the tests where aphids were present several were destroyed daily and about twice as many bollworm eggs hatched as where aphids were not available. Also some of the Orius survived a dusting with nicotine-calcium arsenate that killed all the aphids and bollworm larvae. In other tests individual coccinellid adults and larvae and chrysopid larvae destroyed 10 bollworm eggs (or larvae as they hatched) in 2 to 3 days. Cage tests and insectary tests indicate that O. insidiosus, coccinellid larvae and adults, and Chrysopidae may account for failure of high bollworm egg depositions to develop into correspondingly high bollworm larval infestations under certain conditions. As a large aphid population seems to protect bollworm eggs from predators, there is a possibility that under conditions of high aphid infestation, with Orius and other predaceous insects present, at least partial bollworm control might be obtained by reducing the aphid population by insecticidal means."

Cryolites for control of boll weevil and their effect on leaf aphid population.--Field-plot tests were conducted by R. L. McGarr and assistants, at State College, Miss., this season with cryolites containing approximately 29 percent, 35 percent, and 89 percent Na_3AlF_6, for control of the boll weevil and to determine their effect on the aphid population, as compared with calcium arsenate. The first two mentioned cryolites were mixed with sulfur. Seven replications of each treatment were made on 1/20-acre plots arranged in randomized blocks. Five effective poison applications were made of each treatment between July 27 and August 24. The cryolites were applied at an average rate of 10 to 12 pounds and calcium arsenate 6 pounds per-acre application. Four infestation records for the boll weevil were made after dusting operations were begun by examining 100 squares for weevil punctures on the 4 center rows of each plot at each inspection. Three aphid infestation records were made in the plots after dusting was started by counting the number of aphids per square inch on 100 square inches of leaf area on the fourth leaf from the top of the plants on the 4 center rows at each inspection. The results are summarized in the following table.

Treatment	Squares punctured by: boll weevil	Aphids per square inch of leaf area: Maximum	Average
	Percent	Number	Number
Check	48.4	0.64	0.37
Cryolite, approx. 29% Na_3AlF_6 and sulfur	48.0	1.90	.82
Cryolite, approx. 35% Na_3AlF_6 and sulfur	42.5	2.40	1.01
Cryolite, approx. 89% Na_3AlF_6	27.7	6.33	2.63
Calcium arsenate	15.3	8.97	3.93

It will be noted from the table that the cryolite containing approximately 29 percent Na_3AlF_6 gave no control of the boll weevil; the cryolite containing approximately 35 percent Na_3AlF_6 gave very little control; and the cryolite containing approximately 89 percent Na_3AlF_6 was only about half as effective as calcium arsenate. It will also be seen that where the cryolite containing approximately 89% Na_3AlF_6 was used the aphid build-up approached that for the calcium arsenate, and that the increase in aphids following the use of the cryolite-sulfur mixtures was about in proportion to the quantity of sodium fluoaluminate contained in each.

Cotton varietal resistance to insect attack.--K. P. Ewing and C. R. Parencia report that the varietal-resistance tests at Waco and Port Lavaca, Tex., each showed, as in 1939, that the Stoneville 4A variety of cotton had the earliest and heaviest infestation of flea hoppers but at the same time this variety led the four varieties tested in production. At Port Lavaca, the average seasonal infestation of flea hoppers in the check plots, and the average gain in pounds of seed cotton per acre in the dusted over the untreated plots were as follows: 57.6 flea hoppers and 169.4 pounds gain in the Stoneville 4A variety; 32.3 flea hoppers and 61.7 pounds gain in the Lankart variety; 24.3 flea hoppers and 56.1 pounds gain in the Rogers Acala variety; and 18.0 flea hoppers and 23.3 pounds loss in the Shafter Acala. At Waco the highest average infestation in the check plots was 38.2 flea hoppers and the highest gain was 23.2 pounds in the Stoneville 4A variety. At Port Lavaca the average production of seed cotton per acre in the check and dusted plots of the four varieties was as follows: Stoneville 4A, 1,250.6 pounds; Rogers Acala, 1,016 pounds; Shafter Acala, 1,015.8 pounds; and Lankart, 1,000 pounds. At Waco the production was as follows: Stoneville 4A, 796.4 pounds; Rogers Acala, 724.5 pounds; Shafter Acala, 641.9 pounds; and Lankart, 588.6 pounds.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Cotton stalk destruction.--Field clean-up has been conducted in the south Texas area and the lower Rio Grande Valley of Mexico during the last few years immediately after the picking of the cotton crop, as one of the principal measures for the control of the pink bollworm. Destruction of 1940 cotton stalks got well under way in the lower valley of Texas during the first half of September and unprecedented progress was made in this work during the latter half of the month. By the end of September stalks had been plowed out on 210,000 acres, leaving 10,000 acres to be destroyed. Of this undestroyed acreage, extensions had been granted on approximately 4,000 acres, and the remainder, on which unavoidable delays had been encountered, consisted principally of acreage owned by out-of-State residents. At the end of the period, however, arrangements had been made whereby nearly all of this acreage would be placed in compliance shortly after the first of October, which is the dead-line date for that area. As a rule wholehearted cooperation has been given by each individual farmer, and it is believed a more thorough and complete job of stalk destruction has never been done under the voluntary system. Excellent progress has also been made in the stalk destruction work in all areas under regulation in Mexico, and it was expected that the job would be completed in that area soon after October 1. Field clean-up operations began in a general way in the Coastal Bend district of south Texas about the middle of September, and at the close of the period stalks had been destroyed on approximately 70,750 of the 219,000 acres planted. Weather conditions throughout the year have been very unfavorable for the development of the cotton crop in that area, therefore yield is reduced and maturity of the crop irregular in many communities, resulting in an extreme shortage of labor for harvesting the cotton. Petitions from various sections were being forwarded to the Commissioner of Agriculture around the close of the period requesting that the dead-line date of October 15 be extended.

Vehicular inspection.--Road stations or patrols are conducted on the principal highways leading out of the various regulated areas during the most appropriate periods of the season to prevent the movement of uncertified cotton and cotton products. As the cotton season is drawing to a close in the lower Rio Grande Valley, the Falfurrias road station, which has been operated in that area by this Division since July 16, was turned over to the Division of Mexican Fruitfly Control at the end of September. During the month 15,160 vehicles were checked through the station and 621 confiscations were made, consisting principally of seed cotton taken from pick sacks, pillows, and mattresses. Of the 4,694 pick sacks checked, 3,680 contained some seed cotton. Owing to the fact that there has been such a great reduction in pink bollworm infestation in the Big Bend, it is not considered necessary to operate a road station in that area this season, as has been the custom in past years. However, one inspector has been assigned to patrol duties on the Marfa, Tex., highway during the short time pickers may be leaving that area. No interception of contraband material was made by this patrol during the 2-week period of operation in September. Three road patrol units operated in the Panhandle district during the period. Seed in that area is not sterilized as ginned, and there is considerable movement at this time of cottonseed from gins to oil mills for sterilization for movement outside of the area.

Wild-cotton eradication.--Efforts have been under way for a number of years to eradicate the pink bollworm from southern Florida through the destruction of wild cotton, which serves as a host to this insect. Field operations in that area are usually discontinued from about July 1 until the middle of September on account of unfavorable conditions. Eradication was inaugurated for the present season on September 23, with 10 W. P. A. workers. Requisition has been made to the Works Progress Administration for a total of 90 workers for the Bureau-sponsored wild-cotton eradication project, and through excellent cooperation on the part of officials of that agency our quota had been almost filled at the end of the period. Work was begun this season on Upper Matecumbe Key, but by the end of the month operations were being conducted in practically all areas where wild cotton had previously grown for the purpose of removing any seedling or sprout plants which may have developed since last season. Comparatively few plants were found during the period worked. Very little rainfall occurred in southern Florida during the summer months, and the so-called rainy season did not materialize this season until September. However, during September the rainfall was exceptionally heavy, and a greater number of seedlings may be encountered later than are being found at present. This is all to the advantage of the project, however, because the late development of wild cotton plants results in our being able to get back in the field before the plants mature fruit.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Dusts made from nuts of California buckeye toxic to Mexican bean beetle.--A series of small-scale tests conducted at the Columbus, Ohio, laboratory by J. W. Apple and N. F. Howard have shown that flours made from the meat or hulls of nuts of California buckeye (*Aesculus californica*) are toxic to laboratory-reared larvae and adults of *Epilachna varivestis* Muls., when applied to bean foliage. All feeding tests were conducted under a constant temperature of 85° F. and a relative humidity of 50 percent. The following table summarizes a portion of the results obtained.

Source of California buckeye flour	Insect stage	Quantity of dust applied in chamber	Average length of life after start of experiment	Average daily consumption of bean foliage per insect
		Mg.	Days	Sq. mm.
Hulls--------	Adult	500	3.0	178
Meat---------	do.	500	3.0	191
Do---------	do.	100	4.3	303
Do---------	do.	20	14.0	188
Do---------	do.	10	10.5	237
Untreated---	do.	--	(1)	555
Hulls--------	Second instar	500	3.0	34
Untreated--	do.	--	(2)	150
Meat---------	Newly hatched	100	2.0	11
Untreated---	do.	--	(2)	58
Meat---------	do.	20	5.2	37
Untreated---	do.	--	(2)	138
Meat---------	Third instar	10	22.3	102
Untreated---	do.	--	(2)	127

1/ These adults were living at conclusion of tests.

2/ Most of these larvae pupated and emerged or were living at conclusion of tests.

While the data show that neither the meat nor hull flour are violent poisons, at small dosages over an extended period they do produce mortality. In all cases the amount of foliage eaten per unit of time was much less when the leaves were dusted than when untreated leaves were fed. This reduced feeding on treated leaves was concluded as not resulting from repellency of the insecticide because when either the adult beetles or the larvae were given an equal choice for feeding there was no significant difference in the amount of foliage eaten on treated and untreated parts of a leaf. Other data obtained in the course of these studies showed that female bean beetles lay very few eggs while feeding on foliage dusted with meat or hull flour; however, fewer eggs were laid by females feeding on the meat flour than by those feeding on the hull flour. The viability of eggs produced by poison-eating females was found to be no different from the viability of eggs from beetles fed untreated foliage. Larvae that were fed sublethal dosages of the meat or hull flours formed pupae that possessed rather abnormal wing buds. Instead of lying close to the body the buds extended at right angles from the thoracic region. Only a few adults emerged from such pupae and all but one of these died soon after emergence. These adults also had misshapen wings. Rather definite evidence was obtained showing that alcohol removes some of the toxic ingredient from the meat flour and the hull flour. However, the marcs did retard larval development, which might have been a result of some of the toxic ingredient remaining in the dust.

Tests with California buckeye flour against ants.--In one small-scale test Messrs. Apple and Howard found that flour made from the meat of California buckeye nuts apparently had no effect upon a colony of the ant Formica pallidefulva schaufussi var. incerta Em. when such flour was dusted on the soil about the nest, being replenished after each rain for a period of 43 days. In another test they found that neither the meat flour nor the alcoholic extracts of the meat and hull flours had any apparent toxic effect on two species of ants in their nests when they were fed these materials mixed with honey for a period of 37 days. The treatments tested were 1 percent meat flour in honey, 10 percent meat flour in honey, the extract from 1 gram of meat flour and 9 grams of honey, and the extract of 1 gram of hull flour in 9 grams of honey. The species used in the latter test were Lasius niger (L.) var.. and Prenolepis imparis (Say).

Longevity of beet leafhopper on tomatoes influenced by hairiness of plant.--From a series of experiments conducted by E. W. Davis at the Modesto, Calif., laboratory, it was determined that nonviruliferous adults of Eutettix tenellus (Bak.) live longer when confined in cages on a variety of hairless tomatoes than in cages on varieties having long heavy hairs. All leafhoppers used in the experiments were as nearly comparable as possible in all respects, having been reared on beets free of the curly top disease and selected at random from mixed groups, all of which had been adults for about 7 days. The leafhoppers were confined in cages made of celluloid and strainer cloth, fastened so as to contain a branch of potted tomato plants of about the same age, and daily examinations were made for removing the dead insects. Records showed that, although the mean longevity of female leafhoppers on the 16 varieties of tomatoes tested formed a fairly uniform sequence between the highest and lowest, the mean longevity for female leafhoppers on a hairless variety was 7.75 days, whereas on a variety and 2 hybrids from it, having long heavy hairs, the means were 4.04, 3.34, and 4.36 days, respectively.

INSECTS AFFECTING MAN AND ANIMALS

Reaction of Clear Lake gnats to light intensity and color.--The effectiveness of different lamp intensities in trap catches were studied by A. W. Lindquist at the Nice, Calif., laboratory. Lamps of 100-, 300-, and 500-watt capacity were tested in traps as to their respective lumen and watt ratings. The grams of gnats taken per watt totaled 97.7, 58.7, and 47.9, respectively. In the same sequence the grams of gnats taken per lumen was 6.0, 3.0, and 2.4. It is indicated that, as the intensity of the light increases, a decrease of gnats per unit of light occurs. The larger lamps having more units of light take larger catches. Of the total gnats taken, the 100-watt lamp took 18.8 percent, the 300-watt 34.3 percent, and the 500-watt 46.3 percent. The 500-watt lamp, using five times the energy of the 100-watt lamp, took only slightly more than 2-1/3 times the amount of gnats. The 300-watt lamp, using three times the energy, took 1-3/4 times the amount of gnats taken by the 100-watt lamp. The increased cost of operation of a 300- and 500-watt lamp is probably justified by the increase in catch. Daylight fluorescent lamps, which have a low wattage but high lumen rating (15 watts - 450 lumens), took 737 grams gnats per watt, whereas a 50-watt Mazda took 59 grams per watt. In a series of tests using fluorescent white, green, red, pink, and blue, the daylight lamps always took more gnats per watt, but necessarily more per lumen. The blue lamp took more gnats per lumen and it appears that a color response is in effect.

Burning as an ovicide in control of Clear Lake gnats.--Mr. Lindquist and C. C. Deonier, Nice, have conducted control tests against the Clear Lake gnat which involve the burning of the eggs by gasoline sprayed on the water. By using a 3-gallon hand-pressure sprayer with a nozzle emitting a straight, clean stream, it was found that the gasoline on the water could be ignited and a stream of gasoline moved around over the water. The fire did not follow up the stream, but would race along the water wherever the stream was pointed. Excellent coverage was quickly accomplished on small areas. It was with considerable trepidation that this was tried from a boat out in the lake, but it was remarkably safe and easy, in fact safer than utilizing the sprayer from shore. In 18 tests it was found that the kill of eggs was nearly perfect. The method offers a means of egg destruction in that it is quick, positive, and probably cheaper than chemicals. Preliminary tests indicate that from 25 to 40 gallons per acre will be effective.

Breeding places of dog fly in northwest Florida.--W. E. Dove and Samuel W. Simmons report they have definitely determined the principal breeding places of the dog fly, so that the Bureau now has a basis on which to develop measures for control of the pest. Intensive and extensive observations were made by five experienced entomologists on the coast of northwest Florida during the principal breeding season for the flies. It was learned that most of the breeding this season occurred in tidal deposits of Thalassia and Halodule, two species of marine grasses. Stomoxys calcitrans (L.) deposited eggs on rows of these salt grasses in nature. The eggs hatched within about 1 day but the young larvae did not make rapid growth. The inundations of media by tidewater for 7 hours did not kill the larvae, but repeated submergence by the tides either killed the larvae or preserved the grass so as to prevent it from undergoing fermentation, thereby preventing growth of the larvae. In order to rear larvae in sufficient numbers for larvicide tests, it has been necessary to transport the grasses to locations not affected by tidal action. The matter of delimiting and treating breeding areas is encouraging. The following statements can be made: (1) Control of breeding during the months of July, August, and September would give sufficient protection for the entire season. (2) Breeding is confined to the shores of inner bays and sounds where two species of marine grasses are deposited by tides. A sea alga, Sargassum, may sometimes occur in quantities sufficient for development of fly larvae, but it was not encountered this season. (3) Only portions of shores of inner bays and sounds receive the grass deposits and these depend upon quantities of growing mosses in the bays, the direction and intensity of winds, and the force of high tides. (4) Of the shore lines receiving deposits of marine grasses, artificial control will be necessary only for deposits above the high-tide line, because the grasses prevented from normal fermentation by tides are not favorable for development of fly larvae.

(5) The early windrows deposited by ordinary daily tides, not storm tides, form a barrier against fresh deposits of green grass and tend to keep the latter near the water's edge, where they are submerged by salt water of subsequent daily tides. The high tides of the equinox of September repeatedly covered the new deposits of grasses and prevented development of larvae. (6) Control of dog fly breeding is primarily a question of taking full advantage of natural control, and it is going to require trained scouts to advise exactly when and where chemical treatment will be necessary. (7) Chemical tests for treatment of infested and fermenting grass deposits are encouraging, the principal difficulty being the matter of obtaining penetration to the bottom of the grass deposits.

Inspection of C. C. C. ditches in Delaware.--During the last days of September, G.H. Bradley and H. H. Stage made an inspection of the ditches dug in Delaware by the C. C. C. in 1936-38 as a mosquito-control measure. These ditches are maintained by the State through a biennial appropriation of $25,000.

Concentration of salt-marsh mosquito eggs.--A total of 2,015 soil samples have been flooded by G. H. Bradley and B. V. Travis, of the New Smyrna, Fla., laboratory, to obtain the distribution and abundance of mosquito eggs in salt marshes of Florida. The number of larvae hatching from these samples indicate densities up to nearly 2,000,000 per acre. The greatest concentration of eggs was found around the margins of ponds.

Immunity tests for salt-marsh mosquito bites.--No immunity to irritation has been observed by Messrs. Bradley and Travis, after approximately 1,500 mosquito bites on the right forearm in 1939 and 1,200 on the same area in 1940. Their records show that some people may be three times more attractive to salt-marsh *Aedes* than are others.

Dog filaria development in salt-marsh mosquito.--Mr. Travis reports feeding several adults of *Aedes taeniorhynchus* Wied. on a dog that was heavily infested with heartworm. The mosquitoes were later dissected to determine whether this species is a suitable developmental host for dog filaria. In a mosquito dissected 2 hours after feeding, 15 microfilaria were in the stomach and 69 in the malpighian tubes.

Comparative resistance of mosquito species to chemicals.--In comparative tests conducted by W. V. King at the Orlando, Fla., laboratory, reared *Aedes aegypti* (L.) larvae appeared more resistant to phenothiazine and certain azo compounds than did the stock larvae of *Culex quinquefasciatus* Say. Larvae of field-collected *Psorophora columbiae* D. & K. were found to be much more susceptible to these chemicals than were similarly treated, laboratory-reared *Culex* larvae.

Longevity of sand fly larvae.--J. B. Hull, of the St. Lucie, Fla., laboratory, reports that adult flies have emerged for 148 days from the time of collecting rearing samples. The shortest period of time for such larvae to emerge as adults was 63 days.

Control of American dog tick by dipping dogs.--After three complete seasons of a systematic dipping of all dogs in an area in Vineyard Haven, Mass., Carroll N. Smith reports the degree of its effectiveness is still uncertain. In a locality where the control of ticks was undertaken by means of eradicating meadow mice, Mr. Smith states that the adult tick population remained very low throughout the period June to September.

Trapping horn flies.--According to W. G. Bruce, of the Dallas, Tex., laboratory, horn flies cease to be a problem when the owners are compelled to use a cattle-fly trap daily. Mr. Bruce states this has been clearly demonstrated on the McFarland ranch at Cresson, Tex., where a cattle-fly trap is now in operation for the fourth consecutive year.

FOREIGN PLANT QUARANTINES

Regular passengers.--During the last three Sundays in August the plane inspector at Brownsville intercepted living larvae of Anastrepha ludens (Loew) each Sunday in oranges in stores from Mexico.

Pink bollworm larvae in cotton from Hawaii.--Three cotton bolls found in the suitcase of a passenger returning from Hawaii were found at San Francisco to be generally infested with live larvae of the pink bollworm (Pectinophora gossypiella (Saund.)) and were immediately destroyed.

Chinese chestnuts infested with termites.--A basket of waterchestnuts arriving at San Francisco recently in cargo from China was found on inspection to be heavily infested with termites representing a complete colony of the Formosan species, Coptotermes formosanus Shir., one of the most serious species found in the Orient and one not known to occur in this country. Under an option elected by the owner the case and contents were immediately destroyed.

Dutch elm disease in crate.--Elm has been found to make up a part of the wood used in open crates, for dishes especially, coming from England. At New York from 7 to 8 percent of these crates are made from elm, in part at least. Rodney P. True, of the forest pathology field laboratory, Morristown, N. J., wrote on September 30, confirming the presence of Ceratostomella ulmi (Schwarz) Buisman in a piece of crate from England intercepted in New York during August and found to show suspicious discoloration.

California rust records.--"Hosts for Pucciniastrum ericae in America" is the title of a short paper by W. W. Diehl in the Plant Disease Reporter (24: 373, Oct. 1, 1940). This paper is based on collections made in Golden Gate Park and sent in by the San Francisco office. A specimen of Melampsoridium betulinum (Pers.) Kleb. on Betula japonica was sent at the same time. Arthur's Manual does not list this rust south of Washington and Montana.

Flag smut in Washington.--The recent discovery of flag smut of wheat (Urocystis tritici Koern.) near Goldendale, Wash., is reported by F. D. Heald and C. S. Holton in the Plant Disease Reporter (24:382, Oct. 15, 1940). The extent of the infected area and the source of infection material are unknown. It is expected that greenhouse tests will be made to determine whether or not the fungus in Washington belongs to the same race as that in Illinois, Kansas, and Missouri.

Entomological interceptions of interest.--Two living larvae of the trypetid Anastrepha suspensa (Loew) were intercepted at New York on August 22, 1940, in guava in baggage from Puerto Rico. The coccid Epidiaspis piricola (del Guer.) was taken at the Inspection House at Washington, D. C., on May 1, 1940, on pear tree in express from Switzerland. A larva of the pink bollworm (Pectinophora gossypiella (Saund.)) was found at New York on August 6, 1940, in cottonseed in raw cotton used as packing in mail from India. One living adult and a pupal case of the tortricid Homona menicana (Wlk.) were taken at New York on July 31, 1940, on a ginkgo tree in quarters from Japan. One living adult of the scolytid Renocis mexicanus Blkm. was taken at Nogales, Ariz., in a wooden crate in cargo from Mexico. A living adult of the cerambycid Neoclytus rufus Oliv. was found at New York on September 11, 1940, in wood in dunnage from Trinidad. One living larva of the olethreutid Epinotia opposita Hein. was intercepted at Laredo, Tex., on August 21, 1940, in green string bean in baggage from Mexico. A living specimen of the lygaeid Lygaeus circumlitus Stal was found at El Paso, Tex., on August 31, 1940, on cut flowers in baggage from Mexico. Living adults of the bostrichid Micrapate scapularis Gorh. were intercepted at New York on August 27, 1940, in elder stems used for crating from Mexico. A living adult of the lygaeid Nysius expressus Dist. was intercepted at Seattle, Wash., on August 29, 1940, on cabbage in stores from Japan. A living adult of the neidid Aknisus multispinus (Ashm.) was taken at El Paso, Tex., on August 12, 1940, on mustard in cargo from Mexico. An adult of the lygaeid Gastrodes pacificus (Prov.) was taken on dry pine cones in baggage from Canada at Blaine on September 20, 1940.

Pathological interceptions of interest.--Citrus canker (Bacterium citri (Hasse) Doidge) was intercepted on sour limes from the Philippine Islands on September 16 at Baltimore. Tobacco in a parcel-post package from Canada and inspected at Boston on December 26, 1939, was affected by what the tobacco-disease specialist says are almost certainly spots of "wild fire," Bacterium tabacum Wolf & A. C. Foster. The banana leaf spot (Cercospora musae Zimm.) has been found on banana leaves several times at Galveston recently, including cargo from Costa Rica on September 12. An avocado from Mexico intercepted on September 18 at Laredo was found to have numerous small spots developing. Cercospora sp. was beginning to sporulate on a few of the older lesions. Although the symptoms did not agree with those described for avocado blotch (Florida Bul. No. 161), it might be the same fungus. Cercosporina rhododendri (Ferr.) Sacc., which may prove to be synonymous with Cercospora rhododendri March & Verpl., was intercepted on rhododendrons from Canada on February 17 and March 29 at Seattle. Colletotrichum incarnatum Zimm. was found on a cacao bean pod from Cuba on August 5 at Miami. Colletotrichum sp. and Physalospora sp. (no species of either genus reported on the host) were intercepted on Cyclanthus sp. in cargo from Guatemala on February 29 at San Francisco. Coryneum beijerinckii Oud. was found on peaches in baggage from Mexico on September 14 at Laredo. Diplodia henriquessiana Trav. & Spessa was intercepted at New York on August 29 on orchid plants in baggage from Chile. Gloeosporium cinctum B. & C. was found on August 7 at San Francisco on Dendrobium atroviolaceum and D. spectabile from Australia and on Odontoglossum sp. from Mexico, also on August 7, at Laredo. Phyllosticta sp. was found on July 19 at Brownsville on crapemyrtle from Mexico. Although the spores do not agree with the description it may be the rare P. lagerstroemiae E. & E. Phyllosticta sp. (unlike any species reported on orchids) was found on July 5 at Hoboken on Cypripedium sp. from England. The same fungus was found on varieties of Cypripedium from England on June 17 at San Francisco. Sclerotium orchidearum P. Henn. was found on orchids of the genera Epidendrum, Notylia, Pleurothallis, Sobralia, and Stelis and through the packing in a mail shipment from Costa Rica inspected on July 5 at San Francisco.

DOMESTIC PLANT QUARANTINES

Swain discovers parasite of white-fringed beetle.--Specimens of nematodes, reported in the vicinity of Gulfport, Miss., found to be parasitizing larvae and adults of the white-fringed beetle, have been identified by the Office of Nematology of the Bureau of Plant Industry as Diplogaster (new species). Plans are under way, in cooperation with the Division of Cereal and Forage Insect Investigations, to conduct a survey throughout the areas infested by the white-fringed beetle in Alabama, Florida, Mississippi, and Louisiana, to determine whether this parasitic nematode is present and to gather information relative to its effectiveness as a natural means of control of the beetle. The discovery of this apparently new species of nematode was a result of observations made by Ralph B. Swain, of the white-fringed beetle control project. In the fall of 1939 unusually heavy infestations of the white-fringed beetle larvae were present in one field in the Gulfport area. In the spring of 1940 the number of larvae had decreased to an extent far below that normally caused by winter mortality or the cavernous habits of the pest. It was also noted during the late spring and early summer months that there was little adult emergence from this area. In an endeavor to determine the cause for the decided reduction in beetle population, Dr. Swain carefully examined specimens of adults and larvae and noted that they were heavily infested with nematodes. It is hoped that the result of the survey to be conducted this fall, together with subsequent cooperative work during the spring and summer months, will yield more specific information as to the part that this new species of nematode may play in controlling the white-fringed beetle.

Other white-fringed beetle control activities.--Control operations for the white-fringed beetle were brought to a close in September, after which the field equipment was cleaned and placed in storage. Personnel reductions were gradually effected during the month as the various phases of the work were completed in the different areas. Regulatory activity increased during the month as the harvesting of restricted farm products progressed. Cotton ginning was nearing completion by the end of the month and haying and peanut picking were well under way. Increases were also noted in the number of potted plants and restricted construction materials. W. P. A. projects continued in operation in Alabama, Florida, and Mississippi, assisting in control operations, in addition to carrying on clearing work throughout the month.

Mole cricket control operations in Florida.--In response to recent urgent requests on the part of plant growers in the vicinity of Plant City, Fla., and several other areas in the State, for Federal assistance in the control of emergency outbreaks of the mole cricket, bait materials for these pests are being supplied through the use of funds from the appropriations made for the control of emergency and incipient outbreaks of insect pests and plant diseases. Severe damage by the imported mole cricket, Scapteriscus spp., has occurred to field and vegetable crops, particularly strawberry and other transplanted crops, the infestation in the entire eastern section of Hillsborough County involving 20,000 acres of cultivated crops including 3,500 acres of strawberry. Truck-growing areas in five other counties in the State have been reported as heavily infested. Growers for the last several seasons have, with State assistance, applied control measures in the more severely infested areas, but are now faced with an acute situation because of crop losses of the past winter and other economic conditions in the Plant City area. The control of the pest is recognized as a community project because of the general widespread infestation in cultivated areas and adjacent lands. The State will continue to contribute to the effort. Applications are investigated on the basis of conditions obtaining and work projects are cleared through a State mole cricket control committee composed of representatives of the Commissioner of Agriculture, the Extension Service, and the State Plant Board. Agreements have been entered into with the counties of Hillsborough, Hardee, Lake, Manatee, Pinellas, and Polk, under which the counties will assume sole responsibility for possible claims for damages arising from the use of poisoned bait. Six hundred tons of bait materials had been delivered at Plant City and 600 additional tons purchased the latter part of September. H. T. Rainwater, who assisted in conducting the Bureau field activities in the chinch bug control operations last summer, is in field charge of the mole cricket project, with headquarters at Plant Hotel, Plant City.

Grasshopper survey.--The grasshopper egg survey continued through the latter part of September and into October with preliminary indications of a general downward trend in the possibilities for widespread infestations in 1941. It is anticipated that the egg survey will be completed by the middle of October except in special areas where egg laying has been prolonged owing to geographical location or to development of second-generation *Melanoplus mexicanus* in sections of the Southern Great Plains. In the latter area it has been necessary to delay the survey in order to permit more accurate estimates of egg laying.

Fall development of grasshoppers.--In southwestern Kansas, southeastern Colorado, and the panhandles of Texas and Oklahoma second-generation *M. mexicanus* developed relatively heavy populations of adults in mid-September. This outbreak reached sufficient proportions to induce migrations which spread over considerable areas north and east into Kansas. Farmers evidenced widespread interest in fall baiting for the protection of winter wheat and late crops. Bait materials were furnished in considerable quantity from nearby areas where surplus materials had been stored for winter and on latest reports were still being used rather extensively.

Field headquarters for peach project moved.--The project leader and those concerned with the field supervision of the activities of the phony peach and peach mosaic disease control projects were established early in September at San Antonio, Tex., with new headquarters at the post-office building. That part of the personnel concerned with business administration remains for the present at the former headquarters at Little Rock, Ark.

Fall activity on peach disease control.--Predefoliation inspection of nursery stock in the peach mosaic infected areas was completed during

September and the first few days of October. Infection was found in the stock of two Texas nurseries resulting in the complete destruction under State authority of the stock in one nursery. Consideration is being given to the disposal of the stock in the other nursery. All orchard inspection in the phony peach area has been completed except in Alabama, Georgia, Louisiana, and Texas. Inspection of orchards in the peach mosaic areas was completed earlier in the season.

Peach tree removal work.--The removal of escaped, abandoned, and diseased trees continued in Alabama, Arizona, Arkansas, California, Colorado, Georgia, New Mexico, South Carolina, Tennessee, Texas, and Utah, with the employment of 454 relief laborers. The removal of diseased trees in California constituted the high light of this activity where emergency relief funds became available on September 10. In the subsequent 11-day period over 1,700 infected trees were removed. There remained, however, approximately 16,000 infected trees to be destroyed and work to that end is progressing as rapidly as possible. Grower cooperation in California continues to improve as indicated by the number of waivers obtained.

Sweetpotato weevil control activities.--Surveys conducted during September in Alabama failed to reveal any sweetpotato weevil infestations on properties inspected, which comprised a total of 739. This inspection work was confined for the most part to areas in Mobile and Baldwin Counties, where control activities are under way. In these counties the extensive planting of soybeans following the sweetpotato crop is proving to be of material assistance in eliminating volunteer sweetpotato plants. In Georgia inspections on 416 properties in Thomas, Colquitt, and Charlton Counties were made and no infestations were found. In Mississippi 548 properties were inspected during the month and only 4 infestations of the sweetpotato weevil were found. According to reports, it is expected that the Starch Plant at Laurel, Miss., will begin operations in October and will use 200,000 bushels of sweetpotatoes. In Texas inspection work was conducted in Nacogdoches and Cherokee Counties with negative results. Reports indicate that the sweetpotato crop in that part of the State will exceed that of recent years. At the request of the Louisiana State Entomologist, cooperative Federal-State inspection activities were conducted during the month in 19 parishes. A total of 1,026 property inspections have failed to locate any infestation. The area in which the survey is being conducted comprises important sweetpotato-producing areas in the northern part of the State. The survey will be continued in October.

Transit-inspection conference at Gulfport, Miss.--The transit inspectors of the Southern States region held a meeting with the regulatory inspectors of the white-fringed beetle project at Gulfport, Miss., on September 16 and 17, permitting a thorough discussion of the white-fringed beetle quarantine regulatory problems in which the transit inspectors of the Southern States are primarily interested. Regulatory problems in regard to the sweetpotato weevil State quarantines and the standard State quarantines on account of phony peach and peach mosaic were also discussed. The meeting was also attended by representatives of the sweetpotato weevil project and by the State inspector in charge of transit inspection at Jacksonville, Fla. The inspector in charge of the Southern States region proceeded to Houston, Tex., after the meeting, to make a study of that station in regard to its importance as to transit inspection.

Fall activities on transit inspection.--Transit inspection was resumed at Birmingham and Memphis, and an additional inspector was assigned to the Atlanta station. Arrangements have been made at all southern stations for freight clerks to make notations on train sheets as to the presence of Federal certificates attached to waybills covering quarantined material. An inspector was transferred from Pittsburgh to Washington to assist in the enforcement of regulations pertaining to plants entering the District of Columbia, as well as Federal quarantine regulations, and the Pittsburgh vacancy was filled by a man assigned by the Japanese beetle control project which also assigned an additional inspector to New York City.

Some observations at transit-inspection points.--The inspector at Omaha, Nebr., advises of the establishment of a barge line running from New Orleans to Sioux City, Iowa, which is the first since 1850 that the Missouri River has been opened for navigation as far as Sioux City. The inspector at Boston advises that greatly increased freight movement has necessitated the increase of personnel at freight stations and that freight foremen are making every effort to acquaint the new employees with quarantine regulations so that quarantined material will be set aside for inspection. A gradual increase in nursery stock movement toward the latter part of the month was noted at all stations. Two hundred and thirty-eight violations were intercepted during the month, 88 percent of which were of the Japanese beetle quarantine.

Citrus canker activities.--Several crews of W. P. A. employees are conducting tree-removal activities in the Houston, Tex., area to destroy *Citrus trifoliata* seedlings that have sprouted during the past year and to remove any wild host plants of the canker that may remain in this area. An intensive survey for the disease is also being made by trained inspectors in connection with tree removal.

CONTROL INVESTIGATIONS

Efficiency of methyl bromide fumigation in greenhouse increased.--H. H. Richardson and A. H. Casanges, of the Division of Control Investigations, and G. V. Johnson, of the Division of Truck Crop and Garden Insect Investigations, found that the dosage of methyl bromide could be reduced by approximately one-half in summer and still obtain high efficiency against the Mexican mealybug and the common red spider. Temperatures during fumigation were about the same as those present during winter and spring fumigations (69°-70° F.). Although the air convection currents present in the greenhouse during night fumigations in summer are much lower than those in winter and spring (the heating pipes were cold in summer and temperature differed only 2°-5° from outside), it was found that good distribution of the heavy methyl bromide gas took place in the small greenhouse with either the pan or spray method of vaporization.

INSECTICIDE INVESTIGATIONS

Methods for determining rotenone and total extract in derris and cube.--The first part of a review of methods for the evaluation of derris and cube roots has just been completed by H. A. Jones. This portion includes about 70 references on the determination of rotenone. In addition, methods for sampling the roots and for determining moisture and total extract are also reviewed and a brief statement of the methods of analysis at present in use in the trade is included Later parts will review methods for determining other constituents of derris and cube, methods for their biological evaluation, and articles comparing chemical and biological methods of evaluation.

A new device for compacting powders.--An outgrowth of the particle-size work by E. L. Gooden is a new method of compacting powders. This method was developed particularly for use with the self-calculating air-permeation machine for measuring surface mean diameter. With some of the finest insecticidal powders the older means of compaction were inadequate. In the new method a hand tool of simple design is used to build up within the sample tube a column of any desired height, the compacting process proceeding from bottom to top concurrently with the deposition of the material. The operation is completed in about 5 minutes and only moderate care is required to produce practical uniformity of porosity. A manuscript describing the compactor and its performance has been prepared for publication, and a patent application has been filed.

Sodium arsenites--the system Na_2O-As_2O_3-H_2O.--O. A. Nelson has just presented for publication in the Journal of the American Chemical Society the results of an investigation into the three component system--Na_2O-As_2O_3-H_2O at 35° C. Over 7¼ million pounds of sodium arsenite is used annually by Federal and State agencies for the control of grasshoppers, Mormon crickets, and white-fringed beetles, but in spite of this very considerable consumption, the chemistry of this insecticide was only incompletely known. This investigation disclosed the existence of four sodium arsenites having formulas $Na_2O.3As_2O_3$; $Na_2O.As_2O_3$; $Na_4As_2O_5.7H_2O$ (or $Na_2HAsO_3.3H_2O$); and $2Na_2O.As_2O_3$, in addition to white arsenic (As_2O_3). Of these compounds $Na_2O.3As_2O_3$ and $Na_4As_2O_5.7H_2O$ have not been identified before. The commercial sodium arsenite powder containing 80-82 percent As_2O_3 is therefore a mixture of $Na_2O.As_2O_3$ and $Na_2O.3As_2O_3$, instead of the meta arsenite and white arsenic, as previously thought.

The vapor pressure of phenothiazine.--Phenothiazine when freshly applied is more toxic to codling moth larva than is lead arsenate at the same dosage; however, after a few days the deposit appears to lose much of its toxicity. This loss has been ascribed to a number of factors among which loss of material due to evaporation has been suggested. In order to determine whether the loss in toxicity was due to this factor, O. A. Nelson and L. E. Smith have determined the vapor pressure and rate of evaporation of phenothiazine at temperatures commonly met with under field conditions. The results of their experiments showed that at 40°, 50°, 60°, and 70° C. the vapor pressures were 3.17×10^{-6}; 10.4×10^{-6}; 3.14×10^{-5}; and 8.95×10^{-5} mm. of Hg, respectively, pressures much lower than those of most organic compounds (the vapor pressures of naphthalene and paradichlorobenzene at 35° C. are 0.21 and 2.3 mm. Hg, respectively). The rate of evaporation of phenothiazine dusted on glass plates at the rate of 200 micrograms per square centimeter was found to be 0.19 micrograms per square centimeter per hour, from which it follows that the loss was slightly less than 1 percent of the weight of the deposit over a period of 100 hours. From these data on vapor pressures and rate of evaporation of phenothiazine, it is evident that the loss in toxicity of this insecticide is not due to loss of material through evaporation or sublimation. A paper covering this investigation has been presented to the Journal of the American Chemical Society for publication.

BEE CULTURE

Dilution may improve attractiveness of cedar honeydew to bees.--George H. Vansell, Davis, Calif., states: "Cedar honeydew on the trees early in October gave a reading of 81 percent sugar on the refractometer. Bees returning to the hive had in their honey stomachs similar-appearing material which tested from 50 to 60 percent sugar: This suggests that bees may find this material difficult to work and therefore select that of lesser concentration or may add water to the very sticky honeydew in order to work it. Scale hive colonies on the cedar flow show daily gains of about 1 pound, but following rain there is an abrupt jump to 3 or 4 pounds. This increased yield declines to the former level after a couple of days. This suggests that dilution may improve the gathering of this material. The aroma of cedar honeydew is practically nil. This is quite different from many flower nectars such as orange, star-thistle, or clovers. Exposed blossom honey (which has an 80 percent sugar content) during a good nectar flow is usually not attractive to bees, but during a cedar flow bees are inclined to rob exposed honey. This indicates that aroma may be a factor in this response, since this has been particularly observed with thistle honey which carries a distinctive aroma. Combs wet with thistle nectar were most eagerly robbed when carried into cedar yards. From this it appears that the attractiveness to bees of a sugar solution may be partly due to aroma. There is ample evidence that nectars below 30 percent sugar are less attractive than those of 30 to 60 percent, but perhaps sugar solutions with low aroma, even above this range, may be less attractive."

Spore-sirup method of inoculating colonies with American foulbrood.--S. E. McGregor reports that the spore-sirup method of inoculation, used successfully at the Laramie, Wyo., laboratory, has not been causing disease to develop satisfactorily at Hope. Five different methods of inoculation were used on 21 colonies headed by sister queens. These methods were: (1) 10 M.I.D. spore sirup--50,000,000 spores mixed in 1 quart of sugar sirup and fed to a colony; (2) 40 M.I.D. spore sirup--200,000,000 spores mixed in 1 quart of sugar sirup and fed to a colony; (3) 10 M.I.D. spray--50,000,000 spores mixed with 10 cc. sugar sirup and sprayed directly onto 1-day old larvae; (4) 10 M.I.D. pollen--50,000,000 spores in 10 cc. sugar sirup and 10 cc. pollen placed in cells in the brood nest; (5) comb insert--a piece of comb $1\frac{1}{2}$ by 1-3/4 inches cut from a diseased hive and inserted in a frame of the test colony. The results were as follows:

Method	Colonies tested	Colonies that developed no disease	Colonies that developed disease	Colonies that failed to recover
	Number	Percent	Percent	Percent
Comb-insert------------	4	0	100	100
10 M.I.D. spore sirup--	6	83	17	17
40 M.I.D. spore sirup--	1	0	100	0
10 M.I.D. spray--------	5	40	60	0
10 M.I.D. in pollen----	5	100	0	0

All of the comb-insert colonies developed disease beyond hope of recovery. One of the 10 M.I.D. spore-sirup colonies developed disease beyond hope of recovery. All of the other colonies either developed no disease or developed only light cases and promptly recovered.

A method developed for counting sperm in queenbee spermathecae.--Otto Mackensen, University, La., reports the development of a method for determining the number of sperm in the spermatheca of queenbees. The spermatheca is broken in 1 cc. of tap water, and the sperm dispersed by sucking the water in and out of an eye-dropper pipette. The volume is then increased to 4 cc. and the mixture again thoroughly agitated. The sperm in a 4 cc. sample are then counted with the aid of a haemocytometer and the total number of sperm calculated. Tap water has been found to be as satisfactory as several other diluents used. Good use is being made of this method in determining the effectiveness of various methods of artificial insemination.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Mass flight of a geometrid moth.--A large migration or undirectional flight of what was supposed to be the cabbage butterfly (Pieris rapae (L.)), was reported by George S. King, of Bay Shore, N. Y. The insects were said to occur in enormous swarms over Great South Bay, on the southern shore of Long Island. Specimens were later received from Dr. King and were found to be the geometrid Cingilia catenaria (Drury), the larvae of which are sometimes very abundant on blackberries, huckleberries, and blueberries. This appears to be the first report of such a mass flight of C. catenaria.

Workerlike males of a North American ant.--This Division recently received from W. W. Baker, of the Division of Truck Crop and Garden Insect Investigations, Puyallup, Wash., a very nice series of the ant Leptothorax diversipilosus M. R. Smith, which was collected at Spanaway, Wash., from the nest of the roof-thatching ant (Formica rufa subsp. obscuripes Forel). This Leptothorax is of more than usual interest in that it is the only known North American species of the genus possessing males that are so like the workers in appearance that they can be separated from the latter only by the most careful scrutiny. The species shows a striking similarity in both structure and habits to the European guest ant (Formicoxenus nitidulus Nyl.), which lives in the nests of Formica rufa L. and F. pratensis Retz.

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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR OCTOBER 1940

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ADMINISTRATION

Grace A. Sandhouse

Grace Adelbert Sandhouse, associate entomologist in the Division of Identification and Classification of Insects, died at St. Luke's Hospital, Denver, Colo., on November 9. The courage with which she "carried on," despite the knowledge during several years that the end could not be far distant, was characteristic of her attitude toward her work. It was during this period that she produced some of her finest contributions to science.

Miss Sandhouse was born on June 1, 1896, at Monticello, Iowa. She was graduated from the University of Colorado in 1920. From 1922 to 1924 she held a fellowship in entomology at the same institution, receiving the degree of Master of Arts in 1923. In 1924-25 she was a teaching fellow at Cornell University. During this period she completed the residential requirements for the degree of Doctor of Philosophy.

In 1925 Miss Sandhouse entered the Federal service as a senior scientific aide in the Federal Horticultural Board. In 1926 she was transferred to the Bureau of Entomology as junior entomologist in the Division of Insect Identification, specializing on the identification and classification of the bees. Subsequently she took over the identification of the other groups of the Aculeata and latterly of the sawflies.

As a taxonomist Miss Sandhouse takes high rank. An indefatigable worker with a fine perception for the significance of taxonomic characters, she acquired an international reputation. While still a university student Miss Sandhouse produced several contributions to the knowledge of the bees. Even at this early date, one feature that was to characterize her subsequent work was evidenced, for in these papers, even though she was describing only a single species, she almost invariably presented a key to at least a species group. Among the more important of her writings are revisions of the North American species of the subgenus *Halictus* (*Chloralictus*) (1924); the species of *Agapostemon* of the United States (1936); the species of *Augochlora*, *Augochloropsis*, and *Augochlorella* of the United States (1937); the Nearctic wasps of the genus *Trypoxylon* (1940); the North American species of *Osmia* (1939); the last of which was accorded the honor of being published as Memoir No. 1 of the Entomological Society of Washington. A completed but as yet unpublished work is a catalogue of the genotypes of the genera of the bees of the world.

Miss Sandhouse was a member of the American Association for the Advancement of Science, the Entomological Society of America, and the Entomological Society of Washington. She is survived by her mother, with whom she had made her home for a number of years, and by two brothers.

FRUIT INSECT INVESTIGATIONS

Further studies on the biology of the plum curculio.--Oliver I. Snapp, of the Fort Valley, Ga., laboratory, found that during 1940 approximately 60 percent of the first-generation beetles in the insectary laid second-generation eggs. This was a little less than the proportion depositing eggs in 1937 and 1938, but a little more than the proportion for 1936 and 1939. Second-generation eggs began to form in the bodies of new females on July 5, but it was July 26 before any eggs matured. The peach harvest was completed on July 25. This is the first year since 1923 that the Georgia peach crop was not subjected to attack by at least a partial second brood of the plum curculio. Sixty-one percent of the new beetles deposited second-generation eggs by the end of peach harvest in 1937, 37 percent by the end of peach harvest in 1938, and 46 percent by the end of peach harvest in 1939. Other studies revealed the fact that plum curculio females of the first generation enter hibernation before depositing all of their second-generation eggs. Forty-five percent in the laboratory entered hibernation this year before depositing all of their eggs. Of 39 females of the first generation that had not oviposited during the season, only 1 had developed eggs within her body.

Raisin moth in waste mulberries.--Samples of fallen mulberries were taken from beneath a single tree during the summer by Dwight F. Barnes and George H. Kaloostian, of the Fresno, Calif., laboratory. It was found that infestation was present in samples taken at intervals of about 1 week from May 14 to August 2, indicating that mulberries serve as a source of adults as late as July and August. An average of about 20 percent of the larvae had been parasitized by Microbracon (probably hebetor (Say)) and about 2 percent by Idechthis canescens (Grav.). The calculated populations of raisin moth stages in the waste mulberries under the tree on the dates of collection were as follows:

Date	Individuals found	
	Per square foot	Under tree
	Number	Number
May 14	21.00	59,367
24	209.00	590,843
31	136.00	384,472
June 7	54.75	154,728
14	72.00	203,544
21	50.50	142,763
28	48.00	135,696
July 5	61.00	172,447
12	44.50	125,801
18	23.00	65,021
26	6.00	16,962
August 2	1.50	4,240

MEXICAN FRUITFLY CONTROL

No fruitfly larvae found in October.--Harvesting of citrus fruit for the 1940-41 season started in the lower Rio Grande Valley on October 1. Fruit from only a few groves passed the maturity test during the first few days of the month, but by the close of the month 3,366.5 equivalent carloads of fruit had been harvested and shipped. This is the largest shipment of fruit during any October in the history of the Texas citrus industry. Grove inspections in every district failed to disclose any larval infestations and the operation of approximately 9,000 traps throughout the area resulted in the taking of only 1 Mexican fruitfly.

JAPANESE BEETLE CONTROL

Large-scale soil treatments.--Nearly 450 acres of ground at isolated Japanese beetle infestations, which are being treated to control that insect and avoid the imposition of Federal quarantine, received applications of lead arsenate at the rate of 500 pounds per acre during October. The work accomplished was as follows:

State	City	Area treated Acres
Illinois	Chicago	55.30
Indiana	Elkhart	11.10
	Indianapolis	20.80
	South Bend	19.30
Michigan	Detroit	61.70
	Melvindale	1.50
New York	Dansville	1.25
	Newark	48.60
North Carolina	Burlington	18.90
	Charlotte	11.90
	Durham	5.90
	Greensboro	23.00
	Lexington	4.80
	Rocky Mount	1.30
	Salisbury	3.40
	Spencer	18.00
	Winston-Salem	37.10
Ohio	Ashtabula	27.00
	Conneaut	36.00
	Marietta	4.50
	Zanesville	16.60
Virginia	Danville	13.50

Fall nursery-shipping season progresses.--Although the weather was too mild during the month for the shipment of much nursery stock from some of the southern districts in Maryland and Virginia, there was a definite increase in the inspection of nursery stock from Delaware north. In Delaware 390,882 pieces of nursery stock were certified during the month. As the fall shipping season got under way in the New York districts, the volume of business appeared to be in excess of last year. Two concerns in northern New York used a great many more certificates for parcel post and express shipments than they did last fall. Following a normal trend of big increases over September, October plant shipments from the Philadelphia area reached their highest volume for several years. A permanent inspector was assigned to the West Grove, Pa., section on October 21. Chemical treatments of nursery stock in general increased as the shipping season progressed. Plants fumigated with methyl bromide totaled 322,743 this month, as compared with 136,166 in September. A supply of miscible carbon disulfide and galvanized collars was taken to a Maryland nursery for demonstration. Conditions at this nursery proved satisfactory for carbon disulfide field treatments and the nurseryman will use this treatment to supplement the methyl bromide fumigations and paradichlorobenzene treatments already in use.

Maryland certification activities.--On October 30, inspectors from the Baltimore office fumigated 4,574 hydrangeas that had been packed for shipment. This was done under the direction of H. C. Donohoe, of the Division of Control Investigations, and V. A. Johnson, of this Division's treating section, to determine the effectiveness of fumigating the plants in the shipping containers. Work is under way to determine a satisfactory method of killing grubs in potted hydrangeas in the field. Japanese beetle grubs have been feeding on the hydrangea roots, resulting in considerable loss of plants. Hydrangeas fumigated in Maryland during September totaled 4,871, with an increase to 78,057 in October. Shipments of nursery stock increased considerably in October. During the operation of the quarantine on cut flowers, 48 adult beetles were removed from 3,208 shipments inspected. This compares with 30 beetles removed from 3,968 packages examined in 1938. This year the first adult infestation in cut flowers was found on June 20 and the last on October 6. Twenty camellias of 13 varieties were treated with paradichlorobenzene for 1 grower who wished to determine how these plants would withstand this type of treatment. Certification was also granted for 661 square feet of grub-free grass stolons shipped from the District of Columbia.

New building to facilitate quarantine compliance.--At a large nursery establishment in Princess Anne, Md., a new building has been erected to house the washing, grading, and packing of stock from infested fields. The erection of this building will enable the nursery to wash, grade, and pack stock during the approaching winter season. Previously it had been impracticable to wash the stock during freezing weather, owing to injury to the roots which resulted in later death of the plants. Evidence of improved conditions in the nursery industry is frequently noted in the way of new buildings, leasing of extra ground, and the renovation of old equipment that has been allowed to deteriorate.

Adult beetles removed from inspected articles.--Inspectors in the Philadelphia district found 805 Japanese beetles on cut flowers inspected between June 15 and October 15, and 129 beetles on produce examined during the operation of the fruits and vegetables quarantine from June 15 to September 19. The small number of beetles found on cut flowers inspected was due to instructions from the wholesale cut flower dealers to the growers that they did not want beetle-infested blooms. Temporary inspectors engaged in cut-flower work in the various districts were dismissed at the termination for the year of the quarantine on this commodity on June 15. A few adults were found in Philadelphia up until October 19, when freezing weather terminated their activities.

Grubs collected for experimental purposes.--A crew of men was employed by the treating section of the Division to dig for Japanese beetle grubs. The diggings were made at the Mapledale Country Club, about a mile west of Dover, Del., where there is a heavy grub population. Approximately 75,000 grubs were dug for use at the Moorestown, N. J., laboratory on paradichlorobenzene tests. Grubs were also dug for methyl bromide experiments by the Division of Control Investigations at the White Horse, N. J., laboratory.

Stock to be treated for World's Fair exhibitors.--Several inquiries were received from exhibitors at the New York World's Fair concerning treatment of plant stock to be moved from the grounds after the close of the fair on October 27. Arrangements were made for treatment of the stock with carbon disulfide in November.

Corn borer infestations.--Two new infestations of the European corn borer, both in corn, were reported by the Norfolk, Va., suboffice during the month, one in the lower part of Princess Anne County and the other in Norfolk County. Several trips on the Eastern Shore of Virginia were made to make corn borer inspections and to issue certificates. Last year one of the flower shippers in that area had several shipments confiscated, owing to lack of corn borer certification. This year shippers are requesting certificates to cover all their shipments.

Moth infestations in inspected products.--Sixty-eight shipments of lumber, logs, railroad ties, marble, native trees, nursery stock, mixed greens, and Christmas trees inspected during October yielded 604 gypsy moth egg clusters. In addition, 708 egg masses were found in birchwood and birch bark inspected prior to manufacture into novelties for sale all over the country. Among the heavily infested products inspected was a carload of birch logs being shipped from Conway, N. H., to Philadelphia, Pa. From these logs 88 egg clusters were removed. A carload of lumber inspected at Meredith, N. H., for shipment to Rochester, N. Y., was found to contain 47 egg clusters. Another carload of lumber inspected at Biddeford, Maine, for movement to St. John, New Brunswick, Canada, yielded 36 egg masses.

Temporary inspectors added to gypsy moth force.--Twenty-three temporary inspectors were employed during October to assist in gypsy moth quarantine inspection activities.

Christmas-tree infestation.--On October 25 a gypsy moth egg cluster was found on a spruce Christmas tree presented for inspection at Reading, Vt. This tree was one of a truckload of trees destined to Orleans, Vt., a point outside the gypsy moth infested area, for later reshipment to the

Middle West. This is the first gypsy moth egg cluster that was ever found in the lightly infested area of Vermont on a native spruce Christmas tree presented for inspection. From the infestation found in this tree it would appear that moth infestation is increasing in this lightly infested section.

Record-breaking lumber shipments.--Approximately 10,750,000 board feet of lumber was certified for shipment in October to points outside the gypsy moth regulated areas. This is the largest quantity of lumber ever certified under the gypsy moth quarantine regulations in any one month.

Elm owner fined for interfering with disease eradication work.--The following news story appeared during October in a New Jersey paper: "The owner of a Rumson, N. J., estate was ordered by District Court Judge Joseph Mattice to pay a $100 penalty judgment for his refusal to permit the State Department of Agriculture to remove from his premises an elm tree which experts said was affected with Dutch elm disease. * * * He was charged in a complaint filed by the Attorney General's office with interfering with representatives of the Department of Agriculture in the performance of their duty. * * * According to testimony, the State Department, after an examination which showed the tree to be affected by the disease, sent a crew of men to the Rumson estate on September 17 to eradicate it. The owner refused to permit the men to carry out the work, witnesses testified, and they sought permission from the Rumson police department. Told by police they had authority to remove the tree, the State Department men returned to the premises and started to work, it was related. They left, however, when the owner appeared on the scene with a shotgun. 'Maybe I'm hunting rats,' he was quoted as saying. The judgment was entered by the court after he offered to permit the Department to remove the tree."

First-record Dutch elm disease infestations.--During October first-record cases were reported from Brookfield Township, Fairfield County, Conn., Chalfont Borough and Hilltown Township, Bucks County, and from Plymouth City, Luzerne County, Pa. In the detached infected areas, a diseased tree was discovered in Washington Township, Marion County, Ind., and three infected elms were located in Athens County, Ohio, two of which were in Alexander Township and the other in Dover Township. A first-record infection reported from the town of Preston, New London County, Conn., is the first diseased tree found in this county since discovery of a single infected tree in Old Lyme in 1937. The infected tree was approximately 30 miles northwest of the Old Lyme infection and 60 miles from New Haven. The diseased tree removed in the Preston area showed no signs of feeding by Scolytus multistriatus Marsh., although a number of beetles of Hylurgopinus rufipes Eich. were hibernating in the bark on the trunk. Several entrance holes were found in one of the leaders with the channels started and deserted by the beetles. This condition was found in the leader that showed the most discoloration.

Few outer symptoms observed in infected tree.--A confirmed elm, removed in Deer Park Township, Orange County, N. Y., showed little change in its appearance since it was discovered. Discoloration had extended further down the trunk but had not reached the buttress of the tree and only a few of the smaller branches had died in the crown as a result of the disease. No evidence of bark beetle was observed. Woodpecker work is apparent in some sections of the New York infected zone. One particular tree, north of Newburgh, was found riddled by these birds. This tree had a full crop of leaves last summer and was apparently normal until very recently when woodpecker work disclosed that the tree was heavily infested with S. multistriatus.

Girdled trees still problem in Ohio.--As was the case during last year's elm-sanitation work in the Athens, Ohio, area, crews are again confronted with large numbers of girdled trees. In fact, this practice has increased considerably over that of last year. From 1 property approximately 1,000 girdled elms have been removed. Another property owner is continuing to girdle trees ahead of our sanitation operations. The unwarranted girdling practices are developing to a point where effective sanitation work will be considerably hampered. They may even prevent completion of the sanitization of a safety area around the 1940 disease locations.

FOREST INSECT INVESTIGATIONS

Condition of hemlocks defoliated in 1934 by Ellopia athasaria.--J. V. Schaffner, Jr., of New Haven, Conn., reports as follows on the recovery of hemlock trees which were severely defoliated in 1934 by E. athasaria Walker: "A local outbreak occurred in Warwick, Mass., in 1934 where in September the trees on some 12 acres in a practically pure stand of hemlock were seriously defoliated. Sixty trees in this area were marked for observation concerning their recovery. These trees ranged from 4.8 to 12 inches D.B.H., averaging about 9 inches, and the estimated defoliation ranged from 70 to 100 percent. Their rating as to crown classification was as follows: 15 dominant, 16 co-dominant, 13 intermediate, and 16 suppressed. The site is considered very favorable for hemlock, and there has been no serious defoliation since 1934. The following table shows a classification of the estimated degree of defoliation for the 60 trees in the fall of 1934, the crown classification in 1934, and the condition as noted on October 24, 1940.

Defoliation in 1934	Trees	Trees in various crown classifications in 1934				Trees in various conditions on October 24, 1940				Trees uprooted in 1938
		Dom.	C.D.	Int.	Sup.	Good	Fair	Poor	Dead	hurricane
Percent	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
70	1	0	0	0	1	1	0	0	0	0
75	3	0	0	1	2	3	0	0	0	0
80	6	2	1	1	2	4	0	0	0	2
85	10	2	1	2	5	6	0	0	0	4
90	13	3	5	2	3	11	0	0	0	2
95	15	4	5	3	3	9	4	0	1	1
95-100	12	4	4	4	0	1	1	1	9	0
Total----	60	15	16	13	16	35	5	1	10	1/ 9

1/ These 9 trees were alive at the time they were uprooted in 1938, but since then 3 of them have died.

"It is believed that the above data are representative of the entire area affected. The results definitely indicate that thrifty hemlock trees will tolerate considerable defoliation late in the summer, when the current year's growth is nearly mature, and stand a good chance of recovering. However, if the degree of defoliation exceeds 95 percent a high mortality may occur. Local outbreaks occurred this year in New Haven County, Conn., in two natural stands of hemlock separated by a distance of about 10 miles. In each stand the hemlock trees on some 5 acres were seriously defoliated and the owners are much concerned about the possibility of the trees recovering. This prompted a check-up on the 1934 infestation at this time. The geometrid E. athasaria passes the winter in the pupal stage in the duff. The larvae are normally active from late in July to the latter part of September, but this year a few larvae were found in Connecticut as late as October 22."

Matsucoccus injury increases in Pennsylvania.--T. J. Parr, of the New Haven, Conn., laboratory, reports as follows on an examination of pines in Pennsylvania infested with Matsucoccus gallicolus Morrison: "The period October 16 to 19 was spent taking notes on the condition of pitch and shortleaf pines in the infested plots at Mont Alto and Mount Union, Pa. These plots, with the exception of one at Mount Union, appear in worse condition than they did last year. The exception is a natural stand, where there is some decrease, both in number of twigs and leaders killed this year. The following table gives a brief summary of twigs and leaders killed on these plots during the last 3 years.

Plot No.	Type of plot	Location	Current twigs killed			Current leaders killed			Plot trees dead			Total trees dead
			1938	1939	1940	1938	1939	1940	1938	1939	1940	
			No.	No.	No.	No.	No.	No.	%.	%	%	%
I--	Pitch-pine plantation	Mont Alto	2,393	3,262	3,824	56	61	75	0.0	2.8	2.1	4.90
II--	Short-leaf natural stand---	Mont Alto	216	316	564	20	22	1/ 17	8.26	7.6	12.8	26.03
III--	Pitch-pine plantation	Mount Union	173	169	401	0	0	2	.0	.0	.0	.00
IV--	Pitch-pine plantation	Mount Union	939	757	1,604	26	21	21	.0	2.8	.0	2.80
V--	Pitch-pine natural stand--	Mount Union	1,237	1,295	1,000	27	24	16	.0	.0	.0	.00

1/ Many of the trees on this plot which had leaders killed last year died in 1940."

Beech scale infestation decreased in permanent plots in Maine.--L. D. Casey, of the New Haven, Conn., laboratory, reports as follows on an examination of permanent beech scale-Nectria plots in Maine, made in cooperation with J. R. Hansbrough, of the New Haven office of the Division of Forest Pathology of the Bureau of Plant Industry: "The beech scale-Nectria plots in Maine were examined during the first part of September. In nearly all of the plots the scale infestation was lighter than last year. In only 2 of the plots did the infestation show a slight increase. Nectria infection has increased in most cases and has spread to new trees. In the Liberty plots there was no mortality of beech which could be attributed to the scale or to Nectria. In some cases the decrease in scale infestation was due to dying bark on sections of the trees especially in the case of the larger trees. In Washington County there were 2 plots (Nos. 17 and 18) in which a few trees had died and several others were weakened. This was caused, it is believed, by scale infestation and Nectria infection. Apparently there will be a considerable mortality of beech in the vicinity of these 2 plots within a year or so. The plot at Orland still remains free from scale infestation and no beech scale was noted in the immediate vicinity. The plot at China, which had never been infested, was cut for cordwood this year. J. R. Hansbrough examined the plot at Hamilton, Mass., and reports the scale infestation slightly heavier than last year, with the Nectria condition remaining the same. During July 5 beech scale-Nectria study plots consisting of 50 trees each were established in Westchester County, N. Y. These plots were all lightly infested with scale but no Nectria infection was found."

Elm leaf beetle larvae perforate leaves when feeding.--In published articles concerning the elm leaf beetle (Galerucella xanthomalaena Schr.) it has often been stated that the larvae feed upon the lower surface of the leaves, eating the green tissue on this surface but leaving the veins and upper epidermis intact. Therefore, it has been recommended that in spraying with an arsenical for the control of the pest, particular attention should be given to applying the poison to the lower surface of the leaves. Last spring, C. L. Griswold, Morristown, N. J., noted that first-instar larvae in their customary habit of feeding on the under side of the leaves, often perforated the upper surface. Mr. Griswold carried on an experiment during the summer to ascertain to what extent the larvae perforated the leaves. Small elm trees growing in wooden tubs or metal pails were used. Some were placed in a shaded location in an insectary and the remainder were placed in the laboratory yard, fully exposed to the sun. A lead arsenate mixture was carefully applied to the upper surface of the leaves of two of the trees in the insectary and to the under side of the leaves of two other trees. Larvae were then put on the foliage of all trees. The leaves were perforated by larvae of all three instars, both on trees to which lead arsenate had been applied and on the untreated trees, except on one tree on which first-instar larvae had been placed after the poison had been put on the lower side of the leaves. In the case of the shaded trees this type of feeding exceeded the skeletonizing type in which the upper epidermis is not eaten. On the trees exposed to the sun the skeletonizing type of feeding predominated, especially on the leaves of the upper crown. The experiment suggests that in spraying to control the elm leaf beetle it is not as necessary to take extra pains to apply the insecticide to the under side of the leaves as has been previously supposed.

Adults of Scolytus sulcatus carry Dutch elm disease.--W. D. Buchanan, Morristown, N. J., reports that the Dutch elm disease fungus has been obtained from adults of *S. sulcatus* Fab. which were attracted to apple trap logs. Green apple logs were placed in several locations in northern New Jersey in the spring of 1940. At two locations adults of the scolytid later penetrated the bark of the logs and formed egg galleries. One hundred and fifty beetles taken from the logs at one location were cultured by the Morristown forest pathology laboratory of the Bureau of Plant Industry. The fungus was isolated from four of the beetles. Thirty five adults from logs in another area were similarly cultured with negative results. Apple is probably the usual host of *S. sulcatus* but it also breeds in elm. Mr. Buchanan has previously shown that this insect is capable of transmitting the Dutch elm disease fungus under controlled conditions. The experiment conducted by him in 1940 indicates that adults contaminated with the fungus occasionally occur in the field.

Mealybug on Engelmann spruce in Utah.--In 1939 the Forest Service reported an area of dying Engelmann spruce on the Fishlake National Forest near Loa, Utah, according to R. L. Furniss, of the Portland, Oreg., laboratory. The area was examined in November of that year and a mealybug, identified by Morrison as *Puto* sp., was found to be seriously infesting a considerable stand of spruce. On September 11 of this year the area was again visited and the mealybugs were found to be still active, but the infestation appeared to have abated considerably. Both young and old trees are infested. Although the trees have obviously been seriously weakened, none seem to have succumbed to the mealybug attacks. While the infested stand is of minor economic importance, the occurrence of this pest on spruce is of some significance, because of the possibility of its spread to more valuable species.

Black Hills beetle control on Powell National Forest.--During the season of 1939-40 approximately 17,000 infested ponderosa pine trees were treated by the Forest Service to control an outbreak of the Black Hills beetle on the Powell National Forest, Utah. In September the area was examined by Mr. Furniss, who reports that the control work was very thorough. A subsequent detailed survey showed that the current infestation is 92 percent less than that of last year. Plans have been made and control work is under way to treat several outlying areas that could not be reached last year before the beetles were in flight. When this work is completed, it is believed that the Black Hills beetle threat to the Powell Forest and the adjoining pine timber in Bryce Canyon National Park will be well under control.

Forest insects quiescent in Southwest.--Mr. Furniss also reports, as a result of a short inspection trip made in October through several National forests in Arizona and New Mexico, that primary insect enemies of pine forests in those States are causing very little damage at present. This is borne out by similar reports from forest officers throughout the region. Current infestation consists largely of mixed brood trees containing several species of *Dendroctonus* and *Ips*. Very largely the existing infestation is to be found in lightning-scarred and otherwise injured trees. It is encouraging that there have been no aggressive bark-beetle outbreaks in the Southwest for some years, and the indications are that there are no present tendencies toward an increase.

Oregon and Washington 1940 pine beetle survey completed.--On October 30 the current survey to determine forest-insect conditions and activities throughout the ponderosa pine forests of Oregon and Washington was terminated, according to J. M. Whiteside, of the Portland forest-insect laboratory. Twelve temporary assistants employed by the Forest Service and the Bureau completed the survey of 158 permanent 320-acre check plots in virgin stands on October 3. Two temporary employees of the Bureau assisted the Indian Service with the survey of 8 640-acre plots on the Yakima Indian Reservation, Wash. During the last 2 weeks of the month loss data on 18 half-section plots on selectively cut-over lands on the Malheur National Forest, Oreg., were also obtained. In addition to these intensive plot surveys, the entire ponderosa pine region of approximately 11,000,000 acres was covered by extensive or observational reconnaissance during the summer. In general the infestation trend in this region shows an upward trend and estimated losses for 1940 are higher than those of 1939, except in the Blue Mountains of eastern Oregon. As a direct result of these surveys control projects have been recommended and are now in progress or soon will be started on 3 National forests and 2 Indian reservations.

Risk changes may occur rapidly in ponderosa pine.--W. D. Bedard, Portland, reports the case of a ponderosa pine tree which changed from a good to a poor risk during the course of one season. Early in 1940 the tree in question appeared to be a normal, thrifty 2A with a dense crown and an abundant complement of long, coarse needles. In August it was noted that the tree was shedding an abnormal number of needles and by the end of September it had lost all but the 1940 growth on most branches. The tree now has a very thin crown with a very small complement of long needles. The tree was climbed, but no evidence of insect injury could be found. Additional observations are planned during subsequent seasons to determine the eventual outcome of this sudden risk change.

Dendroctonus valens may indicate high-risk trees.--While marking a large number of high-risk trees on a 640-acre check plot to be used in conjunction with the Bly Experimental Salvage Logging Study, F. P. Keen and W. D. Bedard, Portland, noted the prevalence of D. valens Lec. at the base of many of the high-risk trees which were being marked. This condition was particularly noticeable in lightly burned areas where the root collars of the trees had been scorched or burned. In such areas the D. valens attack was almost invariably restricted to high-risk trees, regardless of the intensity of the burn. Some low-risk trees were severely burned, but were unattacked by D. valens, whereas some high-risk trees were but slightly scorched and had been heavily attacked by this insect. Even where no burning had occurred, D. valens was frequently found at the bases of high-risk trees. No conclusions can be drawn on the basis of this preliminary observation, but the indications are that this insect may play an important role in the decline and final death of ponderosa pines.

Mountain mahogany in eastern Oregon heavily defoliated.--An outbreak of an unidentified lepidopterous defoliator of mountain mahogany (Cercocarpus ledifolius) was discovered by W. J. Buckhorn while conducting western pine bark-beetle surveys on the Malheur and Ochoco National Forests of eastern Oregon during the last month. The infestation covered an area approximately 10 miles in width and 80 miles in length. Although defoliation was comparatively light over most of the area, in certain localities every vestige of foliage had been stripped from these bushes. As this area involves a game refuge where deer depend almost entirely on mountain mahogany and juniper for winter feed, this defoliation of one of their most important browse plants may create a serious forage problem during the coming winter.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Gypsy moth work in remote barrier zone sections.--Several snow squalls occurred during the middle of October in the New England area where gypsy moth work is being conducted, but it remained on the ground only a day or two. Sufficient snow fell in some sections of central and northern Vermont to make driving conditions hazardous, and the high elevations in the Green Mountains were blanketed under several inches of snow. Heavy frosts, wind, rain, and snow contributed to the rapid shedding of deciduous foliage. Because of the shedding of the foliage it was possible to start intensive examinations of growth in the immediate vicinity of points where evidence of gypsy moth infestation had been located earlier in the season, when the foliage was so heavy that a thorough inspection of treetops was impractical. Gypsy moth scouting work in remote and nearly inaccessible areas in the barrier zone is progressing satisfactorily, and it is anticipated that a substantial amount of work will be completed in such areas before severe winter conditions become prevalent. Many of the roads extending back into these unsettled and heavily wooded areas are in passable condition at this time but will be closed to automobile traffic after the first heavy fall of snow, as no attempt is made to keep them plowed out. As much work as possible is done in these remote areas during the latter part of the summer and early in the fall, but it is not always possible to avoid long walks during the winter from the points that can be reached by the trucks to the extensive tracts of woodland where work is needed. However, much potential lost time is avoided by careful planning.

Rain and snow provide opportunities for burning accumulated brush piles.--The fire hazard in the barrier zone was substantially reduced by rain early in October, which permitted the safe burning of large quantities of brush and debris accumulated during gypsy moth treatment work at infested locations in Massachusetts and Connecticut. Although the ground litter was damp, extreme care was exercised, and the fires were kept small and compact. As is the usual practice, all fires were completely extinguished at the end of work each day, to prevent danger to the forests from that source. The snowfall that occurred about the middle of the month provided another opportunity to burn accumulated brush, but the snow quickly disappeared and the burning work was discontinued because of the fire hazard presented by the carpet of newly fallen leaves.

Not enough W. P. A. gypsy moth workers available.--Thus far, it has been impossible to secure and maintain the number of W. P.A. workers needed for gypsy moth work in the 5 States where Federal control and extermination treatment is in progress. Because of the scarcity of industrial plants in Lackawanna and Luzerne Counties, where a large amount of gypsy moth work is done, there has been less difficulty in obtaining workers in Pennsylvania than in most other areas, although the turn-over of personnel is frequently high. At the beginning of October, about 75 percent of the total number of W. P. A. workers requisitioned for assignment to the Pennsylvania project had been supplied and additions during the month brought the total number of employees up to approximately 550. Their work is supplemented by that of National Youth Administration crews, and also by crews supplied by the Department of Public Assistants. As a result of the lack of available workers in Connecticut, where skilled and unskilled workers are in constant demand for many highly developed industrial centers, only a small proportion of the work planned in that State has been accomplished. It is hoped that additional workers can be obtained in Connecticut when road and other construction projects are completed or discontinued on account of cold weather. Similar difficulties have been experienced in Massachusetts, where approximately 10 percent of the total force resigned in 1 week to accept work in private industry and where replacements are inadequate. While the employment situation is slightly better in New York State and in Vermont, it has not been possible to obtain the number of W. P. A. workers needed in either State. The personnel in Vermont was increased by approximately 20 percent late in October, and the men were urgently needed to fill vacancies and to organize additional crews for scouting work in the townships of Castleton and Hubbardton, Rutland County, where several small and widely scattered gypsy moth infestations have already been found, and for work in other localities in that State. In each State the workers available are employed in locations where work is urgently needed, but the work planned for the current fiscal year cannot be completed unless additional men become available during the winter.

Results of gypsy moth scouting in Vermont.--A small force of agents detailed to the reexamination of various locations found to be infested during the fiscal year 1940 in Ripton, Addison County, Vt., failed to discover any evidence of living gypsy moth infestation, despite the fact that several of the old colonies are located in woodlands consisting of tree growth particularly favored as food by gypsy moth larvae. The examination of large tracts of down and lodged trees resulting from the hurricane of 1938 was completed early in October in Eden Township, Lamoille County and in Lowell Township, Orleans County, and resulted in the discovery of one single-egg-cluster infestation in each town. Progress has been very slow in this section because of the tangled mass of forest wreckage that must be carefully examined. Numerous scattered egg clusters were found and creosoted in Castleton and Hubbardton Townships, in Rutland County, and in Pownal and Bennington Townships, in Bennington County. Most of the infestations in Castleton and Hubbardton, which are being scouted for the first time in several years, consist of a single egg cluster each and are at wide distances from each other. In each case careful examinations of the immediate surroundings were made to determine the extent of the infestations, but additional egg clusters were found in only a few instances. The distribution of these infestations indicates that they were established by the wind dispersion of small gypsy moth larvae, probably during the spring of 1940.

New gypsy moth infestations found in Massachusetts.--Living gypsy moth pupae were found in the townships of North Adams, Great Barrington, and Hancock, in Berkshire County, and in Worthington Township, Hampshire County, late in September. It is very unusual to find gypsy moths in the pupal stage so late in the season. Numerous small infestations were found early in October by crews scouting on Hogback Mountain, one of the foothills lying to the east of Mount Greylock, in the townships of Adams and North Adams, Berkshire County. Although all egg clusters found were thoroughly creosoted, no attempt was made to conduct intensive scouting or treatment work at that time because of the density of the foliage and the delayed egg deposition. Several scattered infestations were also found on the eastern slopes of Mount Greylock itself, and it is now evident that extensive spraying work next June, in addition to thorough winter treatment work, will be necessary to completely exterminate the insect in this section. Several gypsy moth infestations have also been found in Hancock Township, Berkshire County, where no scouting has been done since 1938. The general character and distribution of these colonies indicate that their origin may be attributed to wind spread. All infestations found so far are of approximately the same size, usually consisting of one old egg cluster and five or six new ones, which leads to the belief that the infestations have been established about 1 year.

Scouting begun in spruce forests.--Scouting of woodland blocks containing a high percentage of spruce growth was recently started in the townships of Becket, Florida, Savoy, and Washington, in Berkshire County, Mass. Because of the fact that several hundred tons of spruce boughs will be cut and baled for shipment to points outside of the quarantined area, gypsy moth scouting crews in these regions are concentrating their efforts on the examination of woodland areas from which the boughs will be taken. In the event that gypsy moth infestation is found in or near spruce growth from which boughs are to be cut, the egg clusters are creosoted and the operator is warned against moving or baling the boughs until they have been carefully examined for further evidence of infestation. Large numbers of Christmas trees are also cut annually in this section and are handled in the same manner as the spruce bough shipments. With the advent of cold weather, operators in Pennsylvania also began to cut large quantities of spruce boughs within the area quarantined by the State on account of the gypsy moth, thus materially increasing the volume of inspection work in that territory.

Large quantities of favored food plants removed by private industry.--Two small industries in Canaan, Conn., provide an outlet for poplar and white birch cut in the nearby towns in northern Litchfield County. One, a small sawmill, produces staves from poplar, which otherwise would find no market in that locality. The other industry consumes large quantities of white birch in the manufacture of wooden novelties. The wholesale cutting of these trees by the property owners will materially aid the gypsy moth work which is being done in that vicinity to control and exterminate the insect. Poplars and birches occur in large numbers in infested wood lots in that area, and afford favorable food for gypsy moth larvae if left undisturbed.

Shaggy-barked white oaks difficult to inspect.--A crew scouting in the township of Southbury, New Haven County, Conn., located a new gypsy moth infestation about 2½ miles distant from a colony found in the same township during the fiscal year 1940. Later intensive work revealed several new egg clusters on shaggy-barked white oaks, which were prevalent throughout the area and which are very difficult to inspect thoroughly. The examination of 1 of these trees from the ground disclosed the presence of 2 egg clusters, and a subsequent close inspection, made by the systematic and careful removal of loose bark by a crew member who climbed into the tree, revealed 12 more egg clusters that could not be seen until the bark had been removed.

Gypsy moth infestations found in Pennsylvania mountains.--Several gypsy moth infestations have been found in Spring Brook Township, Lackawanna County, Pa., where the country is heavily wooded and mountainous. Although extermination work is difficult in this section on account of the prevalance of ledges and because of the rocky nature of the land, satisfactory progress has been made in reducing the severity of the infestations.

Gypsy moth quarantine affects many shipments in Pennsylvania.--During the period October 1 to 15, 6,883 shipments of various materials and articles were allowed to move on permit in the area of Pennsylvania which is affected by the State gypsy moth quarantine regulations. During the same period, 685 shipments originating in the generally infested area were inspected and certified for shipment. As a result of these inspections, 2 gypsy moth egg clusters were found on cordwood, 4 on surface stone, and 2 on spruce boughs. The shipments were allowed to move after the egg clusters had been thoroughly creosoted and removed, with the exception of the spruce boughs which were burned.

Quarterly report of C. C. C. gypsy moth work.--The report for the quarter from July 1 through September 28 shows that work was done from 3 camps in Massachusetts, 3 in Connecticut, and 2 in Vermont. A total of 20,586 6-hour man-days was used in gypsy moth work on more than 6,000 acres. Over 1,400 acres was rebrushed, and 486 acres thinned. Nearly 20,000 new gypsy moth egg clusters were destroyed in connection with this work, in addition to those killed during the burlapping operations.

C. C. C. gypsy moth work during October.--C. C. C. gypsy moth work during October consisted chiefly of selective thinning and the removal of sprouts of favored food plants in areas previously thinned. Piles of accumulated brush were burned on days when conditions were satisfactory. In accordance with silvicultural principles employed by the C. C. C., the assembling of material for burning was reduced as much as possible, the brush being scattered and the logs left on the ground after being trimmed in areas where the owner did not want the wood and where other conditions were favorable for this method of treatment. A considerable number of large white oaks and old apple trees were removed, and many large oaks and poplars were girdled after the property owners had given permission. Scouting work was begun at several of the camps toward the end of the month, the work being concentrated in areas now accessible but which cannot be reached after a heavy fall of snow. The most advantageous locations for future thinning operations were also selected. Contacts were maintained with local moth superintendents in towns in Massachusetts where C. C. C. work is done in order to coordinate the work of the different agencies, prevent duplication of work, and to promote a better understanding of the results desired and the methods used. Many property owners have also been interviewed and have been taken to see the work in progress, the results obtained, and the need for additional work on their properties. In practically all cases the owners expressed satisfaction with the work and gave permission for the additional work needed.

Time used by C. C. C. on gypsy moth work reduced during October.--The numbers of C. C. C. enrollees available for gypsy moth work under the supervision of this Bureau varied considerably during October, ranging from a low of 984 6-hour man-days during the first week to a high of 1,701, with a total of 6,462 man-days for the period. This total is proportionally less than the total for the previous month, as the September tabulation included 4 weeks, whereas 5 weeks were included in October. The reduction in time was attributable to several causes. There was a low enrollment at the beginning of the new period, and considerable time was used in training the new enrollees in the different phases of gypsy moth work and in the proper use of sharp-edged tools. The latter training is in accordance with C. C. C. safety regulations, which seek to keep time lost because of accidents at a minimum. More time was lost from gypsy moth work because of the training of the new enrollees in fire-fighting technique, to the necessity of holding crews in or near the camps during periods when the danger of forest fires was greatest, and to the actual fighting of forest fires.

PLANT DISEASE CONTROL

Survey work in Missouri, summary.--In recent months, George M. Frandsen, State leader of barberry eradication in Missouri, has made an analysis of the results of control work completed in 31 counties since 1935. The purpose was to determine the type of program that would prove most effective yet economical in certain heavily wooded north-central Missouri counties. A review of the data assembled indicates that of 278 properties on which barberry bushes were found and destroyed, 45 having more than 700 bushes would have been missed had the survey been restricted to farm sites, including the yards, gardens, orchards, and wood lots immediately adjacent to farm buildings. Eighteen properties having 75 bushes would have been missed had the survey included uncultivated territory within a radius of 2 miles beyond properties on which planted barberry bushes were found. In commenting upon the results of work already completed in Missouri, Mr. Frandsen points out that most of the bushes that would have been missed had the survey included only the farm-site and adjacent wooded areas, were found on abandoned farm sites usually considerable distances from passable roads. Eighty-six such abandoned farm sites, some of which had barberry bushes, were encountered by survey crews during the period of 1 month. On the basis of the above, it has been concluded that any survey procedure other than one involving a systematic inspection of all uncultivated land is likely to result in a large proportion of abandoned farm sites being missed.

State W. P. A. project approved for West Virginia.--William M. Watson, State leader of barberry eradication in West Virginia, has received notice that a Bureau-sponsored project in the State W. P. A. program has been approved for operation in the Berberis canadensis area of the southern part of that State. The project provides for the employment of 122 men for a period of 12 months. It is expected that work will begin about January 1. Barberry eradication in West Virginia involves two distinct problems. Although some common barberry (B. vulgaris) is found in the southern part of the State, it is much more prevalent in northern counties where little, if any, B. canadensis has been found to date. According to Mr. Watson, the original survey of B. vulgaris areas in Jefferson County was completed on June 30, 1940, and a survey of Brooke County is now under way. The supervisor in charge of the B. vulgaris work is located at Wellsburg, Brooke

County, and from this point it is planned to work Hancock, Brooke, Ohio, and Marshall Counties.

County governments and other local agencies in Minnesota aid in barberry eradication.--During the last 2 years 12 counties in Minnesota have aided the Bureau in sponsoring barberry eradication projects in the State W. P. A. programs. Aid supplied by the counties, in most cases transportation for workers, is valued at more than $7,000. According to L. W. Melander, in charge of control work in Minnesota, State project crews are now working in Dakota, Pope, and Swift Counties and it was expected that survey would be resumed in Fillmore County early in November.

California blister rust infections.--W. V. Benedict and C. P. Wessela, during an inspection trip early in May on the Oregon side of the Klamath National Forest, looked over a few pine trees for infection and discovered 1 incipient blister rust canker on a small pine a few miles south of the border. W. W. Wagener, of the Division of Forest Pathology, also reported at this time the discovery of 2 small cankers in the Montgomery Creek area on the Lassen National Forest, where numerous infections on *Ribes* were located in 1938. On August 10, Mr. Benedict reported that an important development in the sugar pine region was the discovery of 2 infected sugar pines along Bailey Creek near Viola on the Lassen National Forest. The pines were located by H. G. Lachmund in the general vicinity of the *Ribes* infections found there in 1938. This infection places the southern known limits of pine infection in California approximately 107 miles south of the Oregon border. Judging from negative scouting results insofar as new infections on *Ribes* are concerned, this year, like last, has been another unfavorable year for long-distance spread of infection from the pine infection centers in the North to *Ribes* in California. Although scouts have located numerous rust infections on *Ribes*, all thus far have been identified by the Division of Forest Pathology as pinyon rust. Scouting in the Shasta and Klamath National Forests from late in August through September was directed primarily toward determining the extent to which infection had become established on pines as a result of previous years' spread of the rust to *Ribes*, especially from the waves of *Ribes* infection which blanketed the Klamath National Forest and extended more lightly over the Shasta National Forest in 1937 and 1938. Results on the Shasta National Forest were entirely negative, but over the moister regions of the Klamath National Forest a wide-spread return of infection to sugar pines was found. The infected sugar pines were found near *Ribes* bushes infected in 1937, and some occurred as far south as the latitude of Somes Bar, over 50 miles south of the Oregon border. Infections ranging from a single tree with 2 cankers to over 100 trees with several hundred cankers were discovered at the following places: Poker Flat, Indian Creek Road (3 locations), South Fork of Indian Creek (2 locations), Elk Creek (3 locations), Burney Creek, along the Klamath River at Cottage Grove, Tea Creek and Eyesbar, and on the ridge over Teneyck Creek opposite to Somes Bar. While time did not permit a thorough examination of all drainages in the Klamath National Forest, a sufficiently representative sample of infection conditions over the forest as a whole was obtained, in order to feel reasonably certain that pine infection is now scattered over the area in which sugar pine trees occur on this forest, extending into the Marble Mountains at the southern end of the forest, and probably extending into the northern end of the Trinity Forest.

New blister rust control publication.--Presenting the subject, "Blister Rust Control in the Management of Western White Pine," Kenneth P. Davis, formerly silviculturist of the Northern Rocky Mountain Forest and Range Experiment Station, and Virgil D. Moss, assistant pathologist of this Bureau, have prepared a very timely paper dealing with the ecology of Ribes and western white pine and the effect of timber-management practices on their regeneration and growth. This report is of 34 multilithed pages including 1 full-page map and 6 pages of pictures. It was issued June 1940 as Station Paper No. 3 of the Northern Rocky Mountain Forest and Range Experiment Station.

Blister rust exhibit visited by 80,000 persons.--An exhibit entitled, "White Pine Blister Rust," was displayed at the Pacific International Livestock Exposition at Portland, Oreg., during the period October 5 to 12, 1940. The exhibit is built of knotty white pine and contains a diorama depicting various blister rust control activities in a typical forest setting. Thorough explanations of the various activities accompany the diorama. An excellent specimen of an infected tree trunk is included, plus a good picturization of the summer and fall stages of blister rust on a Ribes leaf. Attendance at the exposition was approximately 130,000 persons. Of this number, about 80,000 visited the blister rust exhibit. Not all the visitors absorbed the message carried by the exhibit, but it is felt that nearly 30,000 persons were given at least an introductory understanding of the blister rust disease. Publications containing blister rust information were offered free to visitors. It is felt that placement of the exhibit at the exposition was a highly successful educational venture. The diorama was displayed again from October 26 to November 1 at the Great Western Livestock Show in Los Angeles, where approximately 6,000 visited the exhibit.

COTTON INSECT INVESTIGATIONS

"Wild Turk's cap" as a host of the pink bollworm.--The first pink bollworm recorded from Malvaviscus drummondii was collected from a green seed capsule of this malvaceous plant at Brownsville, Tex., on September 15, 1939, and reported by L. C. Fife in the Bureau News Letter for September 1939 (v. 6, No. 11, p. 18, Nov. 1, 1939). On October 3 and 4, 1940, about 8,000 blooms and seed capsules of M. drummondii were collected near Matamoros, Mexico, by F. F. Bibby, Ignacio Moreno, Clyde Richmond, and Ivan Shiller and placed in cages for moth emergence. Between October 8 and November 5, 33 moths of Pectinophora gossypiella Saund. emerged from this material, and the emergence may not yet be complete. Also, among the larvae taken from blooms collected and examined on October 4 by I. Moreno, 7 were pink bollworms. Approximately 7,000 additional blooms and seed capsules of wild Turk's cap were collected from the vicinity of Matamoros and approximately 15,000 from the vicinity of Brownsville during the first week of October, and from these no pink bollworm moths have yet emerged. The determinations of most of the moths were made by F. F. Bibby and were later verified by J. F. Gates Clarke, of the Division of Insect Identification, and the larvae were determined or verified by C. Heinrich of that Division. The 40 pink bollworms, collected from or reared from M. drummondii up to November 6, 1940, and the 1 larva collected in September 1939, which have been determined or verified by the Division of Insect Identification, have come from plants growing adjacent to or not far distant from heavily infested cottonfields. This plant is widely distributed in woods and thickets, along canal and river banks, irrigation ditches, fence rows, and other waste land on which dense vegetation abounds in southern and southeastern Texas and in northeastern Mexico. Because of its beauty, wild Turk's cap is occasionally cultivated for ornamental purposes. Both blooms and seed capsules are produced in abundance during the entire year. It belongs to the family Malvaceae and because of its common name, Turk's cap, should not be confused with Turk's cap lily. Other cotton insects reared from Turk's cap at the Brownsville laboratory during October and determined by C. Heinrich were the bollworm (*Heliothis armigera* (Hbn.)), the cotton square borer (*Strymon melinus* (Hbn.)), and *Crocidosema plebeiana* Zell.

Cage and laboratory tests against bollworm, boll weevil, and cotton leaf worm.--R. W. Moreland, E. E. Ivy, and K. P. Ewing, of the Waco, Tex., laboratory, report on the results of cage and laboratory tests conducted during August and September. The insecticides used were calcium arsenate, lead arsenate, calcium arsenate 92.5 percent plus paris green 7.5 percent, regular and micronized barium fluosilicate, Cape aloes, sodium fluosilicate, micronized sodium fluosilicate, basic copper arsenate, basic copper arsenate 1 part plus hydrated lime 1 part, and four cryolites containing 50.2, 66.1, 87.9, and 94.6 percent sodium fluoaluminate, respectively. With the exception of Cape aloes, all insecticides were applied with rotary hand-dust guns calibrated to apply a given amount per acre. A portion of a row of cotton, on which plants to be used had been selected, was dusted with 1 of the insecticides after bollworms were placed on the plants. Laboratory-reared larvae of the second, third, and fourth instars were used. One bollworm was used to a cage in the beginning but later it was found that as many as 5 to a cage could be used without the worms displaying any cannibalistic nature. Following the dusting, cages were placed over the plants to be used. In the boll weevil and leaf worm tests the plants were dusted early in the morning and the cages placed over them before the insects were released. Ten field-collected adult boll weevils or leaf worm larvae were used per cage. The following table shows the results of these tests.

Insecticide used	Bollworm		Boll weevil		Cotton leaf worm	
	Worms	Mortality, 120 hours	Weevils	Mortality, 120 hours	Worms	Mortality 120 hours
	Number	Percent	Number	Percent	Number	Percent
Basic copper arsenate and lime (1:1)	18	100.0	59	98.3	--	--
Lead arsenate	33	87.9	30	86.7	60	96.7
Cryolite (66.1% Na_3AlF_6)	29	82.8	--	--	--	--
Basic copper arsenate	57	80.7	195	76.4	58	77.6
Cryolite (87.9% Na_3AlF_6)	38	78.9	--	--	--	--
Cryolite (50.2% Na_3AlF_6)	11	72.7	--	--	--	--
Cryolite (94.6% Na_3AlF_6)	21	66.7	--	--	--	--
Calcium arsenate	59	66.1	189	70.4	55	85.5
Cal.ars. 92.5%, paris green 7.5%	17	58.8	--	--	--	--
Barium fluosilicate	17	58.8	--	--	--	--
Sodium fluosilicate, micronized	8	50.0	--	--	--	--
Sodium fluosilicate	8	37.5	--	--	--	--
Cape aloes	--	--	--	--	59	0.0
Check	42	2.4	114	9.6	59	1.7

The basic copper-arsenate-lime mixture gave the highest kill, with 100 percent mortality of the bollworms and 98.3 percent of the boll weevils in 120 hours. The undiluted basic copper arsenate did not produce a dust cloud comparable to calcium arsenate nor cover the plants thoroughly, but by mixing with equal parts of hydrated lime and doubling the dosage a much better distribution was obtained and the mortality was apparently increased about 20 percent. Undiluted basic copper arsenate and the mixture with lime also killed bollworms and boll weevils quicker than did calcium arsenate. Lead arsenate gave the best results against the leaf worms, while Cape aloes did not kill any of them. In the laboratory tests bollworm larvae were fed for 24 hours on disks of dusted leaves placed over moist sand in jars and were then given untreated cotton squares for food. The mortalities were lower than in the cages, the best results being 73.9 percent kill with cryolite, 65.4 percent with calcium arsenate, and 61.5 percent with basic copper arsenate.

Southern armyworm on cotton in Florida.--C. S. Rude, of Gainesville, Fla., reports that Prodenia eridania (Cram.) appeared in many cottonfields in Lake, Gilchrist, and Marion Counties, Fla., during the latter half of July. The worms appeared to be migrating to the cotton from nearby tomato and weed fields. Pokeweed was among the most favored of the host plants. The cotton leaf worm (Alabama argillacea Hbn.) was also present, but in many cases the defoliation caused by the armyworm was more severe than that produced by the leaf worm. Dusting with calcium arsenate at 12 to 15 pounds per acre gave only mediocre control and poisoned bait was used with various degrees of success but in general was not entirely satisfactory against the armyworm. In one instance where small pigs had the run of the cottonfield they were observed rooting around the plants to a depth of about 2 inches and eating the armyworm pupae. Examination of the soil revealed no pupae where the pigs had worked, whereas in other cases pupae were numerous. No damage resulted to the cotton from the activity of the pigs.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Inspection.--In the control and eradication of the pink bollworm it is of the utmost importance that we determine each season the status of infestation in areas under regulation on account of this insect and ascertain whether or not any movement has taken place to outside areas. To obtain such information, inspection of gin trash is conducted each season throughout important cotton-producing areas of the United States. Gin-trash inspection was concentrated during October in the Panhandle district of Texas, inside and outside of the quarantined area. Large amounts of trash were run in Tom Green and Concho Counties, in the Panhandle district, where a very light infestation was found last season for the first time. Only one specimen was found in Tom Green County and none in Concho. An extremely light infestation was found in Midland, Martin, and Howard Counties, within the Panhandle, in October, but no new area was involved. Annual inspection in the Arizona district was also begun in October and a light infestation was found in the Glendale area of the Salt River Valley, where infestation was present last season. A few specimens were found in the Safford Valley of Arizona. During the annual inspection in the Pecos Valley of Texas and New Mexico it was found that the infestation in Ward, Reeves, and Pecos Counties, Tex., and in Eddy County, N. Mex., showed a sharp reduction over the past season. For the second consecutive year no pink bollworms were found in Chaves County, N. Mex.

Stalk destruction.--Since the discovery of the pink bollworm in the lower Rio Grande Valley of Texas and Mexico in the 1936 cotton crop, field clean-up has been conducted each season in south Texas and adjacent Mexican areas as one of the principal measures for pink bollworm control. Farmers on both sides of the Rio Grande cooperated practically 100 percent during the present season in carrying out the field clean-up program. With the exception of approximately 4,000 acres of late-maturing cotton, on which extensions were granted in September, and small lots of nonresident property amounting to about 6,000 acres, which required considerable time and work in establishing responsibility, stalk destruction had been completed on the 200,000 acres of 1940 **planted** cotton in the lower Rio Grande Valley on the first of October, the deadline for stalk destruction in that area. This remaining acreage was gradually reduced throughout the month and at the end of the period the original job of stalk destruction had been completed. The field clean-up program was also carried out satisfactorily in the adjacent areas of Mexico. On the first of October 112,000 of the approximate 150,000 acres of cotton in the Matamoros-Reynosa area had been plowed, and stalks had been cut on the greater part of the remaining acreage. Most of the unplowed acreage consisted of low-lying lands along the river front, which had been flooded by excessive rains. At the close of October, stalks on most of this acreage had been destroyed. The deadline for stalk destruction in the Coastal Bend district of the south Texas area was originally established by the State Department of Agriculture as October 15; however, on account of the late maturity of the crop in that area, it was found necessary to extend this date to October 31. Heavy rains throughout the Coastal Bend district during the latter part of October brought field clean-up activities to a standstill and at the close of the period some 14,700 acres of stalks, out of a total acreage of 219,000, remained standing. Most of this unplowed land was in the section of Nueces County, where the crop was replanted late, the first plantings having been destroyed by hail. Owing to unusual conditions, some 50 or 60 farmers requested further extensions at the end of October and a number were granted; however, it was expected that most of this acreage would be destroyed early in November, should weather conditions permit.

Destruction of sprout and volunteer cotton.--Throughout this subtropical area, after a first plowing followed by rains, cotton will sprout from lateral roots left in the ground on account of an imperfect plowing job, and seedling plants will also appear. Besides this type of cotton, there are a considerable number of random plants on acreage abandoned in 1940 and previous years. All of this cotton must be destroyed before it reaches the fruiting stage, in order to maintain an effective starvation period for the pink bollworm. The destruction of such cotton constitutes the second phase of the field clean-up program and was begun toward the end of October. Continuous contact is being made with farmers in an effort to get them to grub out any scattered plants or to replow their land if necessary; however, in addition to the farmer cooperation, it was necessary during the last week in October to place 23 Government-financed grubbing crews in operation to remove sprouts and random plants.

Wild-cotton eradication.--Since the effort to eradicate the pink bollworm from southern Florida and adjacent keys was begun several years ago, very gratifying results have been obtained. The extermination of the insect in that region is being undertaken through the destruction of wild cotton plants, which serve as a host. Arrangements were made to obtain W. P. A. workers to carry on this program for the present season, and operations were begun in the last few days of September.. Requisition was made for a total of 90 W. P. A. workers, and early in October 88 such personnel had been assigned to this project. Almost without exception the same workers assigned to this project last season were again assigned this season, which is a distinct advantage, as the men are already trained in wild-cotton eradication work and have a knowledge of the areas to be worked. In most areas fewer wild-cotton plants are being found during the first clean-up of this season than during the first clean-up of last season, especially in Manatee, Pinellas, and Hillsborough Counties. Reductions are also shown in all sections of the Keys subdistrict, and considerably fewer fruiting plants were found in October this year than in October 1939. It is expected that the first cleaning of the season will be concluded in the areas mentioned above before any appreciable number of wild-cotton plants can mature fruit.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Parasites of lima bean pod borer recovered in the field.--Rodney Cecil, of the Ventura, Calif., laboratory, reports the recovery in the field, for the first time, of two species of imported egg-larval parasites and one native species of larval parasite of *Etiella zinckinella* Treit. Adults of the egg-larval parasite *Phanerotoma planifrons* Nees. were first released in 1936. No recoveries of it had been made until the summer of 1940, although additional liberations had been made in 1937, 1938, and 1939, in the vicinity of pods of the tree lupine (*Lupinus arboreus* Sims) or the common lupine (*L. succulentus*) which were infested with the lima bean pod borer. No liberations of this parasite were made in 1940, because the rearing stock did not survive the winter of 1939-40 in the laboratory. Under these conditions, the recovery of the parasite during the summer of 1940 from field-collected pods of *L. arboreus* infested with the lima bean pod borer definitely established the fact that the parasite *P. planifrons* survived the winter under natural conditions near Ventura. Adults of another imported egg-larval parasite, *Chelonus inanitus* (L.), were released for the first time in 1939 in the vicinity of pod borer-infested pods of *L. arboreus* and *L. succulentus* in three counties near Ventura. During late summer of 1940 *C. inanitus* was reared and recovered for the first time from pod borer-infested pods of *L. arboreus*. This recovery does not necessarily mean that *C. inanitus* successfully survived the winter of 1939-40 under natural conditions, as one additional release of the adult parasite was made in July 1940. Releases of the imported larval parasite *Microbracon piger* Wesm. were made in 1936, 1937, and 1938. Adults of this parasite have been reared and recovered from pod borer-infested pods of wild lupines in 1938, 1939, and 1940. This larval parasite has apparently become well established on the lima bean pod borer on *L. arboreus*. During September 1940 a native braconid parasite, *Angitia* sp. (det. by R. A. Cushman), was reared and recovered for what may be the first time from larvae of the lima bean pod borer taken from soil siftings obtained from under wild host plants. In some collections as high as 16 percent parasitization by *Angitia* sp. was recorded.

Yield of lima beans following first winter's growth of cover crops.--M. W. Stone, Ventura, has reported the first-year results from an experiment conducted on small plots, designed to determine whether differences in the yield of lima beans from injury by the wireworm *Limonius californicus* Mann.

are influenced by the winter cover crop. The hypothesis being investigated is that the growing of winter cover crops over a period of several winters may increase the wireworm infestation and its subsequent damage to the beans, one of the theories being that the adult beetles emerging in the early spring may oviposit more freely where dense green vegetation is present, thus eventually causing an increase in wireworm infestation and damage to lima beans grown after each successive cover crop. The winter cover crops included in the experiment are barley, mustard, sweetclover, vetch, fenugreek, and one series of plots with no cover crop. The following tabulation shows for three of these winter cover crops and the bare fallow plots (1) the average number of *L. californicus* larvae per square foot of soil to a depth of 16 inches, found soon after the cover crops had been turned under in the spring of 1940, and (2) the average yield of dry lima bean seed per 0.01 acre harvested in the fall of 1940. The data show that the differences in neither wireworm infestation nor the yield of beans was significant following the first winter's growth of these cover crops.

Winter cover[1]	Average wireworms per square foot of soil 16 inches deep	Average yield of dry lima beans per 0.01 acre
	Number	Pounds
Barley	1.10	10.9
Mustard	1.26	11.7
Clover	1.09	12.5
Bare fallow	1.05	12.2
Difference required for significance $p = 0.05$	.43	2.8

[1] The results from vetch and fenugreek are not included because there were but 12 replicates of each of these treatments.

These tests were conducted in a randomized-block arrangement of plots in 3 fields, there being 16 replicates of each treatment. Most of the plots were 0.12 acre in size while the others averaged 0.17 acre. The winter cover crops were seeded from November 1 to 6, 1939, and were plowed under from late in February to early in April 1940. The infestation in all plots was determined after the cover crops had been plowed under and before the beans had been planted by means of a hand-operated soil sifter. Twenty 1/4-square foot samples of soil 16 inches deep were taken at random from each plot. None of the soil samples were taken within 9 feet of the edge of any plot. The yield of lima beans was determined by harvesting all beans from 0.01 acre located in the center of each plot.

Beet leafhopper populations on pure and mixed stands of Russian-thistle.--From quantitative samples taken at intervals during the summer and early in the fall of 1940, D. E. Fox, of the Twin Falls, Idaho, laboratory, reports that lower populations of *Eutettix tenellus* (Bak.) were found on mixed stands of Russian-thistle (*Salsola pestifer*) and downy chess (*Bromus tectorum*) than on pure stands of Russian-thistle. On June 21, July 18, August 22, and September 21 the average number of adults and nymphs of the beet leafhopper per square foot of host-plant area were 0.9, 11.8, 14.4, and 8.2 on the mixed stands of Russian-thistle and downy chess, and 3.1, 23.2, 25.9, and 14.1 on pure stands of Russian-thistle. During this period the highest populations of the beet leafhopper were found on the medium-dense, pure stands of thistle, followed in descending order by those on the medium and sparse pure stands. On August 1 and thereafter all stand densities of pure Russian-thistle had approximately the same populations. The leafhopper populations on the mixture of Russian-thistle and downy chess were approximately equal to those on the sparse stands of pure Russian-thistle up to July 11, after which there was an increase in favor of the sparse pure stands. Measurements of the height, condition, and percentage of plant coverage revealed that by July 18, Russian-thistle was the most vigorous on the sparse and medium pure stands and least vigorous on the mixtures of this plant with downy chess. The greatest percentage of cover at the beginning of the season was found on the medium-dense pure stands. By August 14 the sparse pure stands gave the greatest percentage of cover. Sampling to determine the leafhopper populations was done at intervals of 1 week throughout the period June 13 to September 21 on 3 replicated plots of each stand density of pure Russian-thistle and on 9 replicated plots of the mixture of Russian-thistle and downy chess. A $\frac{1}{2}$-square-foot sampling fork was used in determining the populations of beet leafhopper, 15 fork samples being taken in each plot from June 13 to July 18, inclusive, and 10 from each plot from July 25 to September 21.

Effectiveness of cryolite and cube sprays against tobacco flea beetle.--In one series of toxicity tests conducted on small replicated field plots of tobacco grown for flue-curing, Norman Allen, of the Florence, S. C., laborator found that a spray mixture consisting of 6 pounds of cryolite containing 86 percent of the sodium fluoaluminate (Na_3AlF_6) and 2 pounds of cube root powder containing 4 percent of rotenone to 50 gallons of water was more effective against Epitrix parvula (F.) than was a spray mixture consisting of 2 pounds of cube, containing 4 percent of rotenone, to 50 gallons of water. A third spray mixture included in the test consisted of 2 pounds of lead arsenate and 2 pounds of cube, containing 4 percent of rotenone, to 50 gallons of water. The effectiveness of the treatments was determined by counting the numbers of living beetles before and the number of living and dead at intervals after application on 20 tobacco plants per plot. The average reduction in numbers of living beetles 5 days after application was 80 percent for the spray mixture consisting of cryolite and cube, but only 49 percent for the cube spray. The reduction for the lead arsenate and cube spray for the same period was 75 percent. An analysis of variance of the data showed that a difference of 17 percent between treatments was necessary for a significant difference having a probability of 0.05 (chances of 19-1). The percentages of beetle mortality for the 3 treatments 5 days after application ranged from 79 to 84, there being no significant difference. This indicates that, while the treatments used were about equally effective in killing the beetles, the infestation did not increase after treatment on tobacco treated with spray mixtures containing cryolite and lead arsenate as quickly as they did on the tobacco sprayed with the cube mixture only. Each of the 3 treatments was applied to 3 plots of tobacco containing about 1/12 acre each. Application was by means of a mule-drawn traction sprayer, equipped with a vertical spray boom in such a way that both sides of the tobacco plants of every row were sprayed with 3 nozzles. Although the application rates were recorded as ranging from 85 to 108 gallons per acre, including the spillage, the actual application rate of each treatment was about 75 to 80 gallons per acre.

Increasing effectiveness of poisoned bran bait against sweetpotato weevil.--From replicated cage tests conducted at the Sunset, La., laboratory, during June and July, K. L. Cockerham and associates report that greater mortality of adults of *Cylas formicarius* (L.) resulted from a bait mixture of wheat bran and paris green (20 pounds: 1 pound) moistened with extracted juice of sweetpotato, than from a similar mixture moistened with water. The mortality of test insects after 5 days was 85 percent for those confined with the bait moistened with sweetpotato juice, while for the bait moistened with water the mortality was only 48 percent. A mortality of 85 percent resulted among weevils confined with a bait mixture consisting of sweetpotato pulp and paris green (20 pounds: 1 pound) moistened with water, and it was 95 percent for those confined with a bait mixture made of grated sweetpotatoes and paris green (20 pounds: 1 pound). Similar mortalities among weevils confined with wheat bran moistened with the sweetpotato juice and with wheat bran moistened with water were 18 and 30 percent, respectively. Analysis of the data showed that a difference of 17 percent in weevil mortality between treatments was required for significance having a probability of 0.05 (chances of 19-1). These experiments were conducted in cages 9 inches in diameter and 7 inches tall in an outdoor insectary, placed over trays containing sand, in order that both the bait mixtures and the test insects would be exposed to all natural changes in temperature and humidity. In each cage 10 adult weevils were used and there were 4 replications of each test. Mortality counts of the test insects were made each day for 5 days after treatment.

INSECTS AFFECTING MAN AND ANIMALS

Screwworm-control program in Texas.--Results of surveys and research on the biology, habits, distribution, and abundance of the screwworm fly in Texas during the last 5 years indicate that a high degree of control of the pest can be obtained if certain ranch practices are followed during the year, especially during the winter in the southern part of Texas, where it overwinters. On the basis of the research observations, a plan was formulated by which an experimental control program could be undertaken by the Bureau of Entomology and Plant Quarantine, in cooperation with the Extension Service, Experiment Station, livestock associations, and other agencies interested in the screwworm problem of Texas. On October 16, the plan was presented in conference to the representatives of the above agencies at College Station, Tex. The Bureau of Entomology and Plant Quarantine was represented at the conference by P. N. Annand, assistant chief of Bureau; F. C. Bishopp, chief of the Division of Insects affecting Man and Animals, who presided as chairman; and E. C. Cushing, D. C. Parman, and W. L. Barrett, who presented the proposed program. All representatives of the State organizations enthusiastically endorsed the program and offered their full support in putting it into effect. Following the above conference, information regarding the program was presented to the district meeting of county agents of the Texas Extension Service districts at Corpus Christi on October 25 by E. C. Cushing and W. L. Barrett.

Toxicity of pyrethrum emulsion varies with volume of water.--In his report for October, E. F. Knipling states that preliminary laboratory tests show that the volume of water has some influence on the toxicity of pyrethrum emulsion. The volume of water was varied in battery jars in which the surface area was the same. One-half, 1½, and 3 liters of water, respectively, were placed in each jar, representing depths of 1, 3, and 6 inches. Pyrethrum emulsion, applied in 1-to-10 dilution at the rate of 25 gallons per acre, showed the following percentages of mortality of *Culex tarsalis* Coq. in a typical test: 1 inch, 100 percent; 3 inches, 92 percent; and 6 inches, 72 percent.

Stomoxys breeding along Mississippi Sound.--During the week beginning October 13, a survey was made by S. W. Simmons, of the Panama City, Fla., laboratory, of the region from New Orleans, La., to Pensacola, Fla., for dog fly breeding. The Mississippi Sound, which forms the coast line of most of this area, was not indicated to be of importance in *Stomoxys* breeding, as its shores were devoid of bay grass deposits, and none was found growing on the floor of the sound. The bays opening into the sound produce a a broad-leaf bay grass which, when deposited on the shore in sufficient quantities and at a proper height, serves as a media for prolific *Stomoxys* breeding. The two major factors limiting the dog fly infestation in this region are (1) comparatively few bays and inlets for grass production, and (2) almost complete absence of beaches for grass depositions. Dr. Simmons found that the shore line of these bays is grown up with rushes which, in many places, extend out into the water and prevent tidal depositions of bay grass from piling up and affording breeding places.

Efficiency of dikes with pump-gate units in control of sand flies.--J. B. Hull and S. E. Shields, of the Fort Pierce, Fla., laboratory, have submitted a comprehensive account with a statistical analysis of figures on the efficiency of dikes with pump-gate units for sandfly control. A total of 13,603 sand fly larvae were isolated from 343 soil samples collected from undiked mangrove marshes, an average of 39.66 larvae per sample. A total of 7,492 larvae were isolated from 341 soil samples collected from undiked pickleweed marshes, an average of 21.97 larvae per sample. A total of 1,051 larvae were isolated from 325 samples collected from diked mangrove marshes, an average of 3.23 larvae per sample. A total of 1,043 larvae were isolated from 341 samples from the diked pickleweed marshes, an average of 3.06 larvae per sample. From all samples from undiked marshes, 21,095 larvae were isolated, an average of 30.84 larvae per sample, and from all samples from diked marshes, 2,094 larvae, an average of 3.12 larvae per sample. If we consider the number of larvae isolated from undiked marshes as 100-percent infestation, then the infestation in the diked marshes was only 10.12 percent, and sand fly breeding has been reduced 89.88 percent. The ratio between samples collected between undiked and diked marshes was found to be 78.83, which is highly significant. An analysis of all data clearly showed that the number of larvae isolated from undiked marshes was significantly greater than the number of larvae isolated from locations of similar distances from drainage ditches in the diked marshes.

FOREIGN PLANT QUARANTINES

Disease of Citrus medica.--A fungus resembling *Sphaeropsis malorum* Pk. and *S. tumefaciens* Hedges, but with thin membranous pycnidia not Sphaeropsis-like, was intercepted on October 7 at New York on a *Citrus medica* fruit in cargo from Palestine. The mycologists have no previous record of such a fungus on *Citrus* from Palestine. The material obtained was inadequate for satisfactory study.

"Gall" disease of fir.--Small galls found at New York on December 14, 1939, among the needles of *Abies balsamea* from Newfoundland, in a cargo shipment of 3,048 trees, have been determined as sclerotia of *Sclerotinia kerneri* Wettstein, not reported heretofore as apparently occurring in North America. It seems possible that sclerotia of the fungus have been seen previously by pathologists and assumed to be insect or mite galls.

Fly-speck fungus on orchids.--An attempt is being made to determine the identity of a fly-speck fungus which has been noted on orchids from South America. Apparently the fungus is a species of *Scolecopeltidium*, or *Scolecopeltium* according to some authors. Although of little economic importance, the identity of the fungus is of some scientific interest and material in condition to study will be collected when practicable until its identity is established or until it can be described, if it is a new species.

Entomological interceptions of interest.--Eight living larvae of the trypetid *Anastrepha mombinpraeoptans* Sein were intercepted at New York on October 17 in golden apple in baggage from Puerto Rico. An adult of the lycaenid *Everes comyntas herri* (Grinnell) was taken at El Paso, Tex., on September 9 in string bean in baggage from Mexico. A living adult of the scarabaeid *Cyclocephala signata* Drury was found at Brownsville, Tex., on October 3 in the cabin of an airplane from Trinidad. Living larvae of the phalaenid *Sesamia cretica* Led., were taken at Philadelphia on September 24 in corn husks in stores from Spain. A living adult of the chrysomelid *Disonycha xanthomelaena* (Dalm.) was intercepted at St. Albans, Vt., on September 24 with clover and grass hay in mail from Canada. A living curculionid adult, *Diaprepes famelicus* Oliv. var., was found at New York on October 4 in the cabin of the *Yankee Clipper* arriving from Lisbon, Portugal, and Horta, Azores, and Darrell's Island, Bermuda. A living adult of the chrysomelid *Oedionychis durangoensis* Jac. was taken on an ear of green corn in baggage at Nogales, Ariz., on September 30 from Mexico. Four living adults and 5 living larvae of the platypodid *Platypus australis* Chapuis were intercepted at Norfolk, Va., on September 13 in walnut log in cargo from Australia. One living larva of the tortricid *Platynota rostrana* (Wlk.) was found at New York on September 24 in plantain fruit in cargo from Cuba. Living adelgids *Chermes nusslini* (Borner) were intercepted at Blaine, Wash., on July 26 on fir in baggage from Canada. This same insect was taken at Seattle, Wash., on June 28 in spruce tips in baggage from Alaska.

Pathological interceptions of interest.--*Aecidium* sp. was found on August 17 at Nogales, on purslane leaves in baggage from Mexico. *Ceratophorum* sp. was intercepted on leaves of *Erythroxylon coca* in cargo from Peru in April, May, June, and August at New York. The fungus we have tentatively called

Ceratostomella fimbriata (S.&H.) Elliott was again found on October 25 at New Orleans, causing a rot of carrots from England. Cercospora musae Zimm. was found on October 14 and 21 at Galveston on banana leaves from Haiti and on October 14 at New York on the same host from Puerto Rico. Ditylenchus dipsaci (Kuhn) Fil. was found on October 5 at New York in a shipment of Japanese narcissus bulbs. Elsinoe australis Bit. & Jenk. was found on October 2 at Galveston on oranges from Argentina. Gloeosporium orchidearum Karst. & Har. was intercepted on October 4 at New York on an unnamed orchid from Venezuela. Melampsora medusae Thuem. was intercepted on October 31 at El Paso on cottonwood leaves from Mexico. Melanconium betulinum K. & S. was found on October 8 at New York on birchwood crates from England. Mycosphaerella citrullina (Smith) Gross. was intercepted at New York on October 16 on Cucumis anguria in mail from Haiti. Pleosphaerulina briosiana Pollacci and Pyrenochaeta penicillata Fckl. were found on August 27 at New York on alfalfa from Kenya Colony, Africa. Rosellinia sp. was found on October 29 at Nogales on wild grass in cargo from Mexico. Sphacelotheca sorghicola (Speg.) Zundel was found on September 5 at New York in broomcorn grain from Argentina. Vermicularia dematium (Pers.) Fr. was found on October 11 at Galveston on okra pods from Puerto Rico.

DOMESTIC PLANT QUARANTINES

Late baiting for grasshoppers.--Control activities by farmers increased materially in October in the Texas and Oklahoma Panhandles, particularly in the latter half of the month following the flights of Melanoplus mexicanus Sauss. from southwestern Kansas. Farmers reported good kills where bait was applied, but considerable damage occurred as infested fields were abandoned where no baiting was done. Field margins of winter wheat were completely destroyed in considerable areas in the southern part of the infestation.

October flights of grasshoppers.--The area most heavily infested with second-generation M. mexicanus in mid-October included the eastern tier of counties in Colorado, the western half of Kansas, and parts of the Oklahoma and Texas Panhandles. In the northern half of the area flights were generally of minor importance and local in nature, but in the southern half, several heavy flights from southwestern Kansas extended the infested area approximately 100 miles into Texas. Early in October heavy flights were reported from six counties of southwestern Kansas.

Season's inspection for phony peach discontinued.--All phases of inspection work for the phony peach disease were discontinued in October. Even in Alabama and Georgia defoliation of trees made it impossible to complete the work outlined. All activities are now directed toward the removal of trees found affected with phony and mosaic diseases during the last inspection season and in removing abandoned and escaped peach trees.

Texas peach-mosaic quarantine revised.--The State of Texas revised its peach-mosaic quarantine, effective October 15, 1940, removing, as prohibited products, all restrictions on plums except those of the Maynard variety.

Chinch bug survey under way.--At the request of several of the States in which chinch bug outbreaks were serious in the last growing season, a cooperative survey of the more heavily infested areas is being conducted in

Kansas, Indiana, Iowa, Missouri, Nebraska, Oklahoma, and South Dakota, for the purpose of estimating probable control needs next year. Following a Federal-State conference held at Des Moines on November 2, surveys were begun in the more northern area. By the time the work in this area is completed the chinch bugs will be in hibernation in the more southern States, it is believed, and the survey will be extended into Kansas, Oklahoma, and southern Missouri. Pest-control officials of Illinois and Ohio report that preliminary surveys indicate that chinch bug infestation is not serious in these States. In South Dakota, although the situation was not serious last season, preliminary surveys by the State inspectors indicate the possibility of a heavy infestation next year and Federal assistance was therefore requested in a survey of 4 or 5 counties in the southeastern corner of the State. H. T. Rainwater is directing the field work, with headquarters at Room 1208 New Post Office Building, Chicago. Philip Luginbill is assisting. Eleven Federal inspectors have been assigned to the work.

Mole cricket baiting.--Assistance in the control of mole crickets in the truck-crop infested areas of Florida was continued during October in Hardee, Hillsborough, Lake, Manatee, Pinellas, Polk, and Volusia Counties. On November 2 authority was given to extend operations, under agreements, to five additional counties, the total area involving approximately 40,000 acres of truck crops. Four mixing stations are in operation. There have been purchased and made available 1,200 tons of bran and 170,000 pounds of calcium arsenate. The bait formula, originally consisting of $7\frac{1}{2}$ pounds of calcium arsenate to 100 pounds of mill-run bran, with sufficient water for mixing, was recently changed to 10 pounds of calcium arsenate to 100 pounds of bran, on the recommendation of the Florida State Plant Board and the Division of Truck Crop and Garden Insect Investigations of this Bureau. H. O. Schroeder is in field charge of the control work, with headquarters at Plant City, Fla., replacing H. T. Rainwater, now in field charge of the chinch bug survey.

Results of inspection for white-fringed beetle.--White-fringed beetles were found this year on a total of 13,649 acres not previously known to be infested. The total known infested acreage on September 30 was 87,898 acres. Most of the new findings were adjoining or near the old infestations, the more important new areas being near Pensacola, Fla., Mobile, Ala., and Long Beach, Miss. The inspections were confined largely to the peripheries of known infestations and to railroad lines and highways leading out of the infested areas. Special attention was given to the eradication areas.

No sweetpotato weevils found in northern Louisiana.--Cooperative sweetpotato weevil inspection, which has been conducted in that part of Louisiana lying north of the area where infestations were known to be generally distributed, has been completed with the result that no infestation of the weevil was found in the northern area. Work was conducted in 28 parishes lying north of and including East Feliciana, West Feliciana, Concordia, Catahoula, La Salle, Grant, Natchitoches, and Sabine. The inspection, conducted at the request of the Louisiana State entomologist, consisted of checking planting stock in the field, as well as the seedbeds, and in some instances wild host plants also. The work was begun on August 22 and completed on October 18.

Hendrickson sees transit inspection demonstrated.--Roy F. Hendrickson, director of personnel of the Department, observed transit inspection in operation at Chicago on October 31, and signified considerable interest in the mechanics of the examination of shipments at the terminal.

Transit inspection at the various stations.--The month's work in New York City resulted in 104 interceptions, the irregularities involving 1 or more of 3 different quarantines in shipments consigned to 30 States, the District of Columbia, and Hawaii. Through the assignment of an inspector from the Japanese beetle force, a "straight freight" inspection tour was arranged at New York, making possible the checking of heavy movement of cotton from the pink bollworm area, scrap metal from the white-fringed beetle area, and forest and quarry products from the gypsy moth area. The Boston inspectors report that, although the October shipments showed an increase of 17 percent over October 1939, in the volume of restricted material examined, there is better quarantine observance on the part of commercial shippers of nursery stock, cable reels, and lumber. Seventy-five percent of the violations found at Boston in October were inspected in transit for the presence of pests, were certified, and allowed to proceed. At Memphis a set-up for the checking of nursery stock shipments arriving by truck from Texas nurseries over the southwestern transportation lines has been put into effect. The Dallas station was reopened on October 21. During the remainder of the month 679 shipments of cotton samples were observed in the mails at that station, while express and freight consignments yielded large quantities of commodities requiring inspection.

Soil samples intercepted.--For the last 2 years transit inspectors have intercepted and returned shipments of soil samples consigned by individuals from the Japanese beetle area to an establishment in Ohio that advertised free analysis of the soil. This fall, however, only a few such shipments have been found, the Ohio firm having arranged for the analysis at a point within the regulated area.

CONTROL INVESTIGATIONS

Insect resistance to insecticides experimentally altered.--The role played by the hemocytes and nephrocytes of the American cockroach (Periplaneta americana L.) in the maintenance of the insect's resistance to poisoning by sodium arsenite and nicotine was investigated by J. Franklin Yeager, E. R. McGovran, Sam C. Munson, and E. L. Mayer, at the Beltsville, Md., laboratory. The methods used involved loading the hemocytes with injected Chinese ink (carbon) particles, or loading the nephrocytes with injected trypan blue, and determining by insecticidal tests, in which contact applications of the insecticide were made, whether or not the attempted blockage had altered the resistance of the injected roaches (nymphs) to the poisons. The results indicate that a functional blockage of the hemocytes but not of the nephrocytes was obtained, that blockage of the hemocytes with Chinese ink caused a decrease in the resistance of the injected roaches to sodium arsenite and, to a slight extent, to nicotine, and that loading the nephrocytes with trypan blue had no effect on the resistance of the reaches to either poison, insofar as indicated by the insecticidal tests. An explanation of these results can be made, partly at least, on the assumption that the hemocytes function as part of an internal defense mechanism and that, when they become loaded with phagocytized particles, their functions are interfered with. The negative results relative to the nephrocytes do not show that the nephrocytes fail to act as part of an internal mechanism, but only that they failed to influence the resistance of the roaches under these particular experimental conditions.

INSECTICIDE INVESTIGATIONS

Relationship between constitution of halogenated phenols and toxicity.--Studies concerning the effect on toxicity (to goldfish) of the introduction of halogens into the phenol molecule were reported recently by W. A. Gersdorff and L. E. Smith in the American Journal of Pharmacy (v. 112, No. 4, pp. 197-204; No. 8, pp. 316-322; and another article, in press). Monosubstitution of chlorine, bromine, and iodine in each of the three positions was considered. Toxicity is affected with respect to both concentration and survival time. According to the minimal product of concentration and survival time (which measures toxicity in the range of most powerful action), the relative toxicity of the nine compounds at 27° C. to 3 gm. goldfish, as compared with that of phenol, is as follows: o-chlorophenol, 1.15; o-bromophenol, 1.25; m-chlorophenol and m-bromophenol, 1.53; m-iodophenol, 1.61; p-chlorophenol and p-bromophenol, 1.87; o-iodophenol, 2.01; and p-iodophenol, 7.78. Owing essentially to a shift in the concentration factor alone, the most pronounced differences between the iodophenols and the chlorophenols and bromophenols are: (1) Each iodophenol is more toxic than the corresponding compound containing chlorine or bromine. (2) The ortho and meta compounds have changed places, however, in the order of toxicity so that the latter is the least toxic of the iodophenols. (3) The para compound has a pronouncedly greater toxicity than its least toxic isomer, it being five times as toxic in the case of the iodophenols, as compared with one and one-half times for the chlorophenols and the bromophenols.

Preparation of new insecticide, trichloromethanesulfonyl chloride.--A recent chemical abstract refers to a Russian article giving a method for the preparation of trichloromethanesulfonyl chloride and describing its use for the control of the sugar beet weevil. Following a request for this compound from one of the Bureau entomologists, attempts to obtain the original article failed. A procedure was then developed by M. S. Schechter and H. L. Haller in which the yield of the compound is about five times that obtained by the methods described in available literature. The compound is a lachrymator, a fact which may limit its use as an insecticide.

Testing growing plants for nicotine.--The November 1940 issue of the Journal of Official Agricultural Chemists contains an article by L. N. Markwood on a method for testing living tobacco plants for their nicotine content. By use of this method tobacco breeders can select desirable plants, such as high-nicotine or low-nicotine individuals, directly in the field, without having to harvest the entire crop for later analysis. A small portion of leaf, such as a disk of about 20 mm. diameter, is disintegrated with strong sulfuric acid and the diluted extract so obtained is purified by treatment with lead oxide. In this way all the interfering substances occurring in the tobacco are removed and the small quantity of lead dissolved by the treatment is also removed, with elemental magnesium. A final solution is thus obtained, which contains all the nicotine originally present in the sample. This small quantity of nicotine can be determined best by methods especially developed for estimating very small quantities of nicotine. In the same issue of the above journal Mr. Markwood discusses two such methods, one being a turbidimetric measurement of the suspension resulting from the interaction of nicotine and phosphotungstic acid, while the other is a colorimetric procedure depending upon measurement of the red color produced by nicotine and beta-naphthylamine. A valuable by-product of the research on determining nicotine in the living plant was the discovery that a certain type of tobacco, Maryland broadleaf, contains a notable quantity of nornicotine. In fact, about 95 percent of the total alkaloid consists of nornicotine, while the remainder is nicotine. This order reverses the usual relationship and is of special significance as nornicotine has insecticidal toxicity equal to, and even exceeding, that of nicotine, while at the same time its toxicity to animals is much less. As the names indicate, there is a very close relation between the two alkaloids, nicotine being the methyl derivative of nornicotine.

BEE CULTURE

Bacillus larvae in intestinal tract of honeybee larvae.--E. C. Holst, Laramie, Wyo., reports: "In the October 1, 1940, issue of the News Letter (v. VII, No. 10, pp. 25-26) A. W. Woodrow, of the Intermountain States Bee Culture Field Laboratory, reported successful production of American foulbrood in honeybee larvae by individual inoculations with spores of Bacillus larvae White, provided the larvae were inoculated less than 2 days after hatching from the egg. Microscopic examinations of stained smears from inoculated larvae revealed that spores ingested by such larvae germinate promptly and produce chains of from 30 to 40 cells in 24 hours. Multiplication of B. larvae continues within the digestive tract of the larva until large numbers of rods can be demonstrated. These rods persist in the intestinal tract throughout the subsequent larval development until the insect dies, generally after sealing and cocoon spinning, either in the larval or pupal stage."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

A new lepidopterous record for the United States.--In material submitted for determination by Leith F. Hitchcock, of the Commonwealth of Australia Prickly Pear Board, at Uvalde, Tex., J. F. Gates Clarke reports a series of 17 specimens of Cremastobombycia lantanella Busck (family Gelechiidae). This is the first record of this species from the United States. It was described from the Hawaiian Islands (Proc. Ent. Soc. Wash. 12: 133, 1910), where it had been introduced from Mexico.

The third North American record of a rare, parasitic ant.--W. W. Fassig, of the Delaware Agricultural Experiment Station, recently submitted for identification 31 winged queens of an ant which he had found at Newark, Del., on August 24, 1940, in a nest of the pavement ant (Tetramorium caespitum (L.)). These specimens appear to be Anergates atratulus (Schenck), a well-known, but comparatively rare, degenerate European ant, which is parasitic on T. caespitum. The males and queens of A. atratulus, which are the only castes represented in this species, are unable to care for and feed themselves and, therefore, live entirely at the expense of the host species.

Before taking their nuptial flight from the T. caespitum nest, the A. atratulus queens mate with their wingless, pupoidlike brothers, after which they seek adoption in some new colony of the host ant. The workers of a successfully invaded T. caespitum colony accept the A. atratulus queen, destroy all their own males and queens, as well as immature specimens, and aid the queen of the parasitic species by rearing her future brood. No specimen of Anergates had been found in North America until 1934, when W. S. Creighton recorded a single winged queen from Edgewood, N. J. Creighton considered the specimen to represent a new species and described it as A. friedlandi. On July 4, 1936, J. C. Bridwell took another winged queen at Kearny Station, Arlington County, Va. This he believed to be atratulus. Neither Creighton's specimen nor Bridwell's was taken from the nest of its host species. A number of the queens collected by Fassig and the single specimen collected by Bridwell are on deposit in the National Museum. From available evidence it appears that A. atratulus and its host species represent introductions into the United States.

A European mirid recorded from the United States.--C. F. Doucette, of the Bureau's laboratory at Sumner, Wash., submitted for determination several specimens of a mirid stated to be infesting the lower side of Digitalis foliage, spoiling the appearance of the plant by causing spotting and yellowing. The species was determined by H. G. Barber as Dicyphus pallidicornis (Fieber), a European species recorded as feeding on Digitalis purpurea in England. Apparently this is the first record of its occurrence in the United States.

A new distribution record for a pest of apple.--Among material submitted for determination by C. F. Doucette, Sumner, Wash., was a large series of Anthophila pariana (Clerck) (Glyphipterygidae). This species was formerly placed in the genus Hemerophila. The first record of its occurrence in North America was published by E. P. Felt (Journ. Econ. Ent., v. 10, p. 502, 1917), under the title, "Apple and Thorn Skeletonizer." In that paper the insect was listed from several localities in New York State. In the National Museum there are specimens from Connecticut, Rhode Island, New Jersey, and New York, but those received from Mr. Doucette, in Washington, represent the first known record of the occurrence of A. pariana in western United States.

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